THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIV. No. 1891.] LONDON, AUGUST 8, 1899. [51ST YEAR. PRICE 6d.

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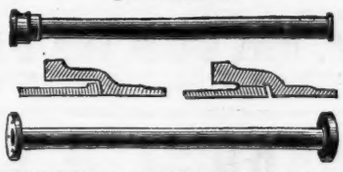

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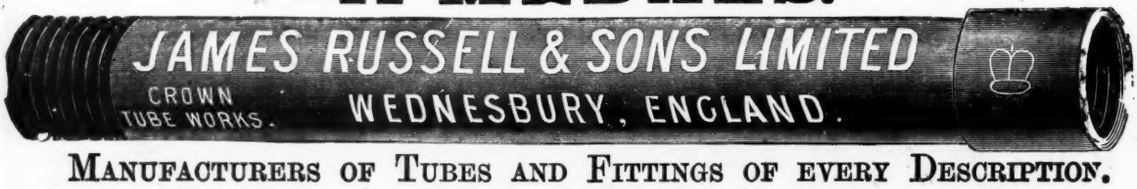

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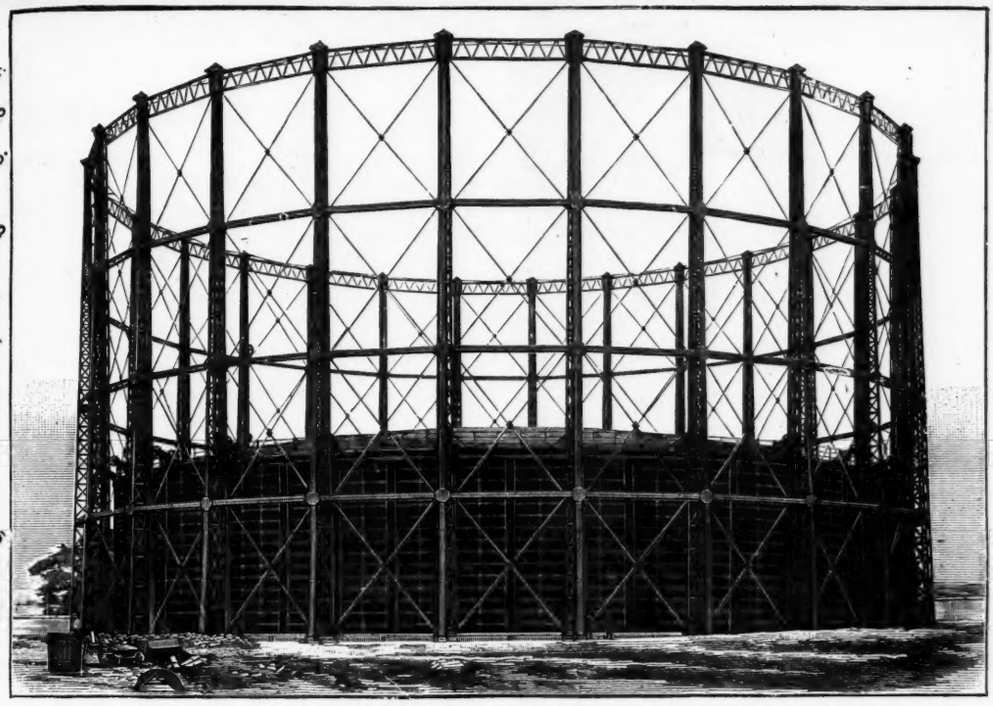

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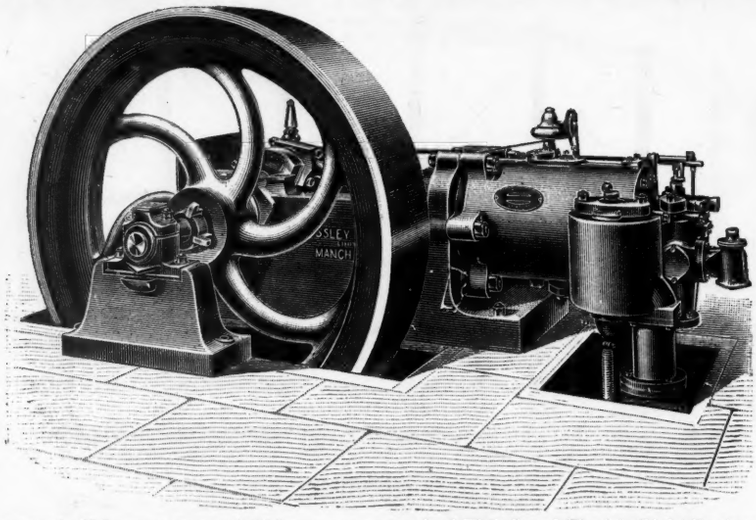

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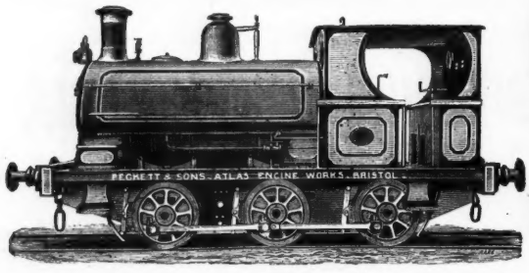

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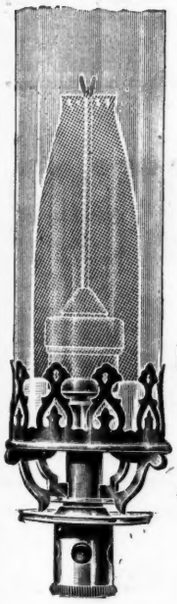

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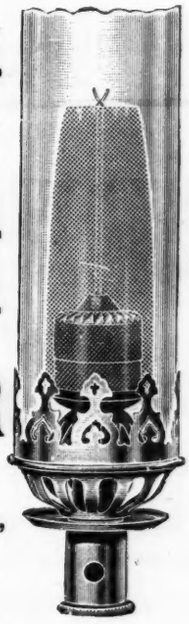

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FOR ENRICHING GAS IN BULK.

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IMPROVED GAS GOVERNOR.

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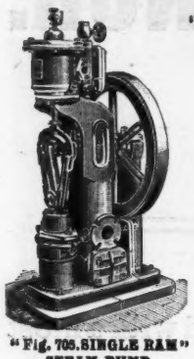

"Fig. 705. SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

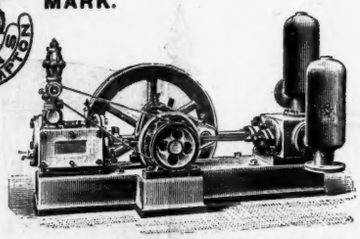

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 713 "DOUBLE-RAM" STEAM-PUMP.

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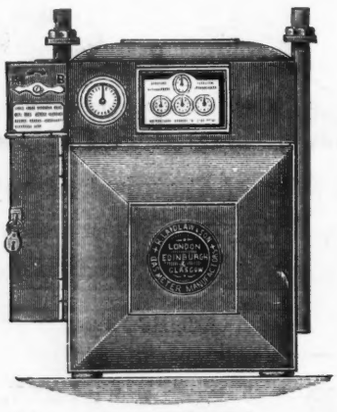

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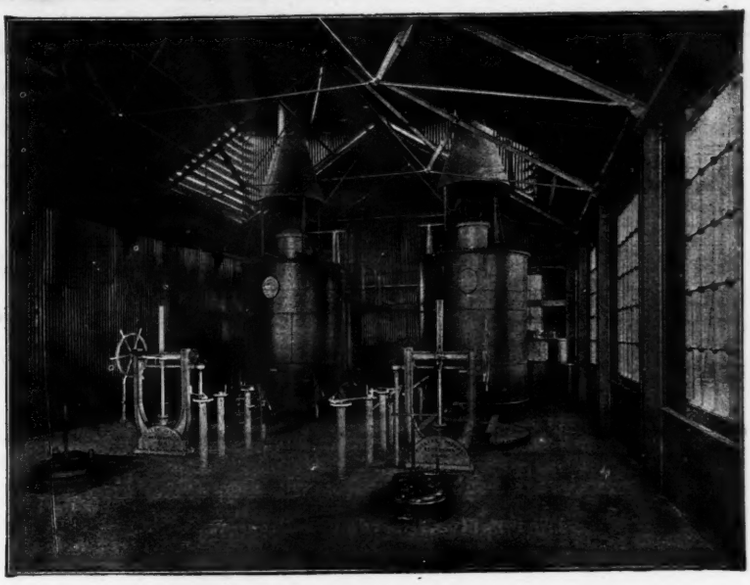
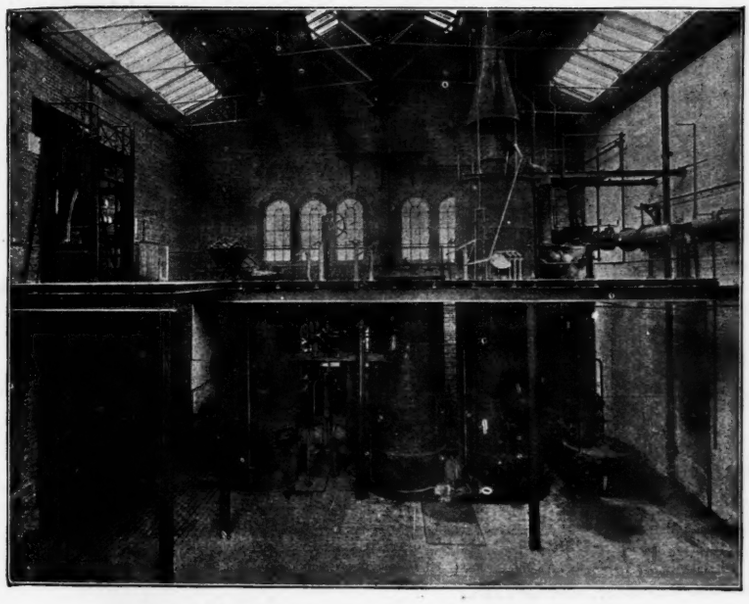


Water-Gas Plant at Southall.



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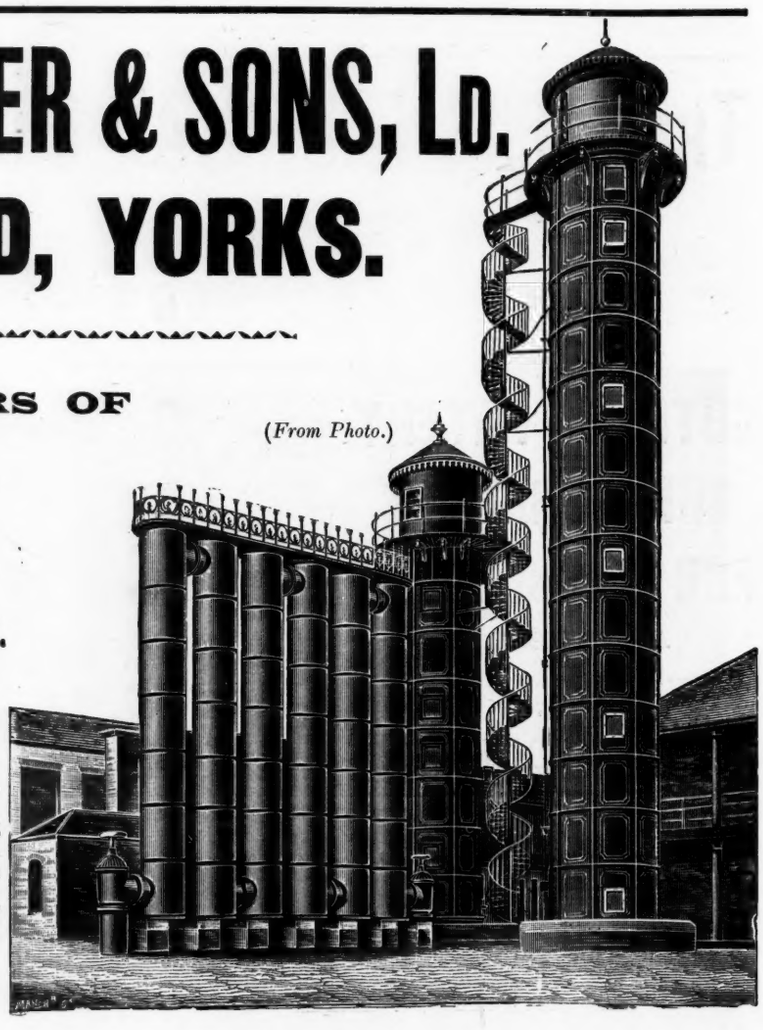
(*From Photo.*)



View illustrating Condensing and Scrubbing Plant erected for the Accrington Gas and Water Board by R. D. & Sons, Ltd.

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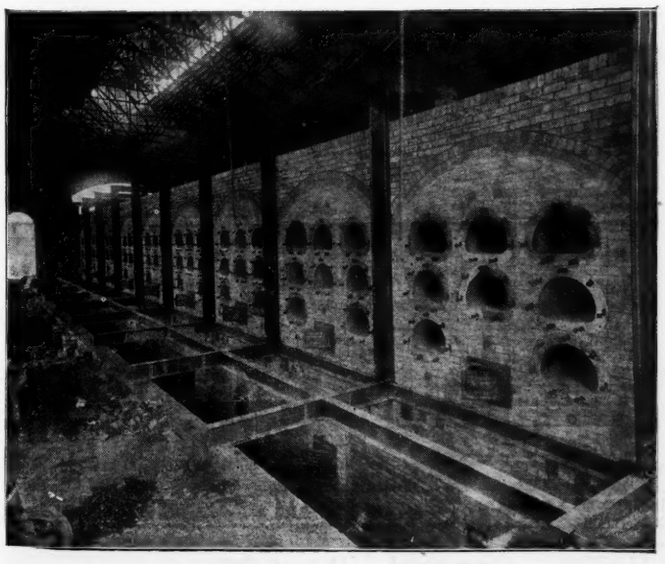

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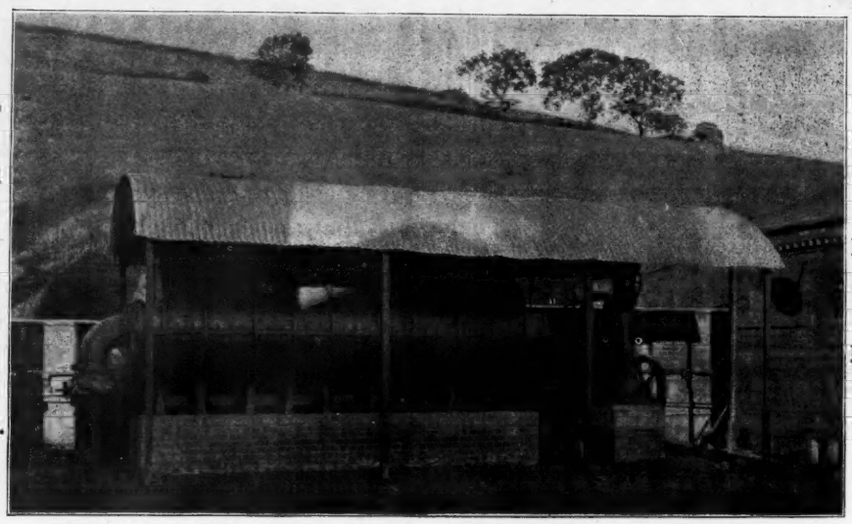

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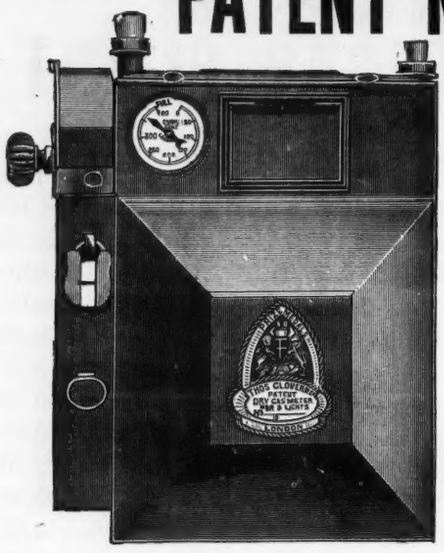

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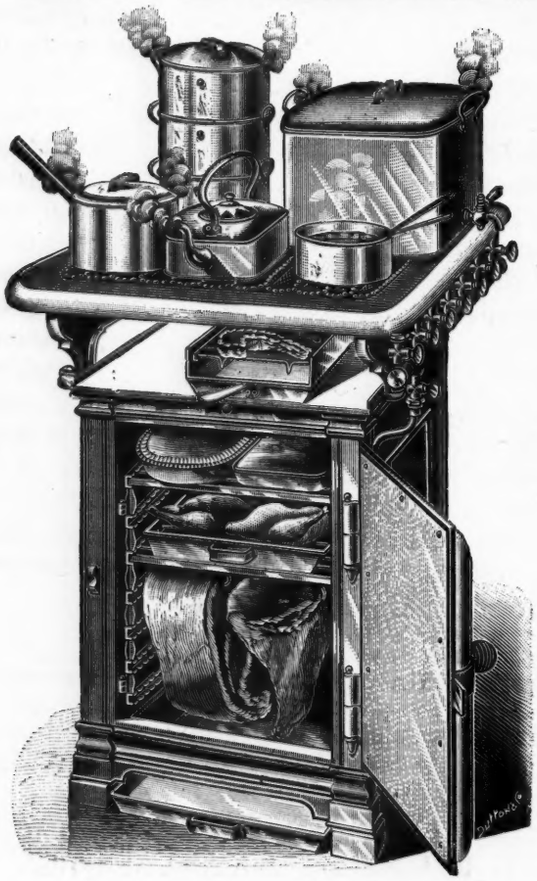

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EDITORIAL NOTES.

The Attitude of the Board of the Gaslight and Coke Company—"Non Possumus!"

THE Administration of the Gaslight and Coke Company had a great opportunity, at the ordinary general meeting of the proprietors last Friday, of showing that some small glimmer of common sense still actuates their counsels; and they missed it. Such is the only just qualification of a directorial performance which those who witnessed it, with full knowledge of the circumstances, must have followed with deep regret. If the Governor, who read nearly every word of his speech, had only gone one little step to meet the views of the opponents of the Administration; if he had uttered just one word of acknowledgment that the adverse criticism of the Horseferry Road by the Powers of Charge Committee might be well founded in any particular; if he had held out the faintest hope that the grievance of the Chartered consumers would be lightened in the future—the Company might have breathed again. But he did none of these things. Not only so, he was so ill-advised as to find fault with the composition of the Parliamentary Committee who had been his judges; and he committed the crowning folly of declaring that, as it had been in the beginning, and was now, so it ever would be with respect to the difference in the prices of gas in London north and south of the Thames. What fatuity! If the Committee are challenged next session to show further cause than appears in the evidence submitted to them why Parliament should withhold its confidence in the present Administration of the Gaslight and Coke Company, the official pronouncements of this unhappy day will surely supply it. This language is strong, we admit; but it is justified by the circumstances of the case.

What are the facts? The Governor—the responsible spokesman for an Administration whose Money Bill had been thrown out by a Committee of the House of Lords, and whose conduct of their business had been condemned by a Committee of the House of Commons—flung the big balance on the last revenue account in the face of Parliament by declaring that, but for the rejection of the Bill, there would have been a reduction in the price of gas. Does the Horseferry Road oligarchy think for a moment that this is a way to get what it wants next time? Then the Governor affected to by-pass the portentous resolution of the Commons Committee in favour of a reduced standard price, by contending that, for the immediate future, the Company would only ask for debenture capital. Capital is capital, however disguised; and Parliament will have as much to say about debenture capital as about ordinary stock. The Governor talked on Friday in the ears of an assembly who had not, for the most part, had an opportunity of reading the report of the Inquiry Committee. Consequently, it was easy for him to declare that the report was against the weight of evidence in this, that, or the other particular. He did not, however, attempt to meet the charge of over-capitalization, which is emphasized in paragraph 31 of the report (near the bottom of the first column of our reproduction, p. 313 *ante*), after allowing for Mr. Field's explanation. The official statement now is that badly-needed expenditure for labour-saving plant, and other remunerative things, must be stopped for want of capital. But a year ago the Governor said, in reply to Mr. Livesey's stricture upon the excessive capital expenditure, that they were always providing for the future. This future seems to have been a very restricted one. What Parliament will want to know is whether capital is likely to be better husbanded in the future than in the past; and when previous extravagance is not so much as confessed, where is the hope of amendment? As regards the finding of the report on the subject of management, it was obviously not possible for the Committee to test the evidence, say, as to the loss of £100,000 on a purchase of coal, or that due to the (admitted) mistake of stocking sulphate. These questions are declared to be for "those responsible for "carrying on the business." Clearly, a special inquiry by the Board, or by a Shareholders' Committee, is indicated here. Why does not Colonel Makins say: "My official "conduct, and that of the Secretary and General Manager, "have been condemned. Those who have said so much "on this score, ought to say more. I, therefore, demand "an independent and searching investigation." We would not make this suggestion before the meeting, in order that

there should not be any suspicion of forcing the Governor's hand in the matter. But now that the golden chance has been lost, everybody is at liberty to say what nine men out of ten thus situated would have felt called upon to do.

If the dividend of the Gaslight and Coke Company should at some future time be treated as disrespectfully by Parliament as that of the City of London Electric Light Company, the official conduct of Friday's meeting will be largely to blame for such an unhappy result. The handwriting, as one of the independent speakers declared, is on the wall; and the Horseferry Road authorities are the only persons who cannot or will not read it. Parliament will not see the consumer overtaxed for ever, in order that the era of fat dividends, inaugurated in 1876, shall be continued in the failure of legislation to fulfil its intention. Nor will it take the word of an official for his own merit as a man of business. The immediate result of the irreconcilable attitude of the Administration towards the judgment of the Committees of both Houses of Parliament will be an active revival of the agitation against the Company. What will be the ultimate consequence of this official obstinacy, we hesitate to predict. Parliament will deal with the Company at the proper time, regardless of Colonel Makins and his *non-possumus*, which we are only too well persuaded will cost the Company dear before all is done.

The Law of "Cutting-Off."

THE Judicial Committee of the Privy Council have had to deal with a remarkable "cutting-off" case from Canada, as to which one can only wonder that so simple a point has never been disposed of before. It was a question of whether a Gas Company's right to cut off the supply to premises in respect of which the consumer is in arrear is restricted to the particular premises, or applies to any other premises occupied by the same consumer. In the case in point, a gas consumer in Montreal had two places of business, and he paid his gas bill for one, but not for the other. Whereupon the Company served him with notice, and cut off the gas from both places. The consumer brought an action against the Company in the local Court of First Instance and won; the Judge deciding that the right of cutting-off was limited to the premises in the case. The Court of Queen's Bench of Lower Canada, on appeal, reversed this decision; but it was restored by the Supreme Court of Canada. Against this judgment the appeal lay to the Privy Council. One would think a similar set of conditions must often have arisen nearer home. In the Montreal case, the customer was troublesome. Cutting-off notices were not strange to his experience; and as he did not seem to mind having to go without gas at one place, the Company felt justified in putting pressure upon him in respect of his other house. Instead of paying, he went to law; and the Privy Council have decided that the case is "too clear for argument." The debt incurred was personal to the consumer, not territorial or domiciliary. The default is that of the consumer; and the Company are held to be justified in using their statutory remedy against him. There is no limitation in the Gas-Works Clauses Act of 1847 to any particular premises. Once more, therefore, this fine old statute has been justified.

A Gas Company's Action for Libel.

A REMARKABLE lawsuit between the Ilford Gaslight and Coke Company and the publisher of a local newspaper has been not the least interesting consequence of the parliamentary conflict over the gas supply of the district which has bulked so largely in our news columns of late. Most readers of the "JOURNAL" have some acquaintance with the ways of small country or suburban journalism. The traditions of Eatanswill still linger in the editorial offices of these useful and entertaining periodicals, and serve to spice their columns, which would otherwise run too much to stories of bolting ponies, and reunions at Host Soandso's, of the United Ancient and Modern Unity of Prehistoric Philanthropists. Fortunately, the justices or the guardians, or the churchwardens or the overseers, are generally doing something to agitate the editorial mind, and ensure its regular boiling over into the customary amount of large type matter. At Ilford, the organ of local opinion had a fine chance for making "copy" out of the squabbling between the Urban District Council and the Gas Company. A serious struggle for the possession of the right to supply gas in such a neighbourhood as Ilford has become, is a matter in which the local newspaper press may legitimately take a leading part. But, unfortunately, it is precisely in respect of its treatment of such an important question that the average newspaper exhibits weakness. Questions of gas or water supply are for experts to deal with. Unless the issues are clearly defined, and controversy kept to the limits of the points at issue, public opinion will become hopelessly confused between trivialities and essentials. The local newspaper in this emergency can usually be depended upon to make the very utmost of the former, and to sink the latter. In the Ilford instance, the "Ilford "Guardian" had the brilliant idea that the Gas Company had arbitrarily increased the gas bills for the last quarter of 1898 and the first of the current year, with the object of "showing an inflated revenue, in order that the Company "might succeed in getting their Bill through Parliament." It was darkly hinted that "something not quite clear to "the ordinary observer had been on foot." The Directors of the Company, not very wisely, saw fit to construe this as libellous, and took action against the publisher of the newspaper. They have failed, and been mulcted in costs. This result is only what might have been expected. It is possible to sympathize with the members of the Board and the officials of a Company (local residents) in their soreness under the ignorant or perverse attacks of a local newspaper upon their collective reputation. There are probably thousands of people, reputed sane, and not suspected of lacking intelligence for the conduct of the ordinary affairs of life, who firmly believe that gas bills are made out for amounts adjusted by the will of the Gas Company. Probably there are many more who believe that, although gas bills are based upon the registration of the meters, the latter can, by some occult means, be made to mark whatever the Company please. It is to such people that the articles of the "Ilford Guardian" would appeal. All the greater shame to those journalists who pander thus to prejudice, ignorance, and vulgar suspicion. But if every public man or public body were to put in action the law of libel against every newspaper indulging in misrepresentation, obscurantism, or downright abuse, the judicial system of the country would not be equal to the strain. After all, Parliament, and not the scribes of the "Ilford Guardian," is the judge of the deserts of the Ilford Gas Company. Before this tribunal, the Company have been justified, and confirmed in the possession of a valuable property. In the circumstances, therefore, the wise thing to do is to pass a sponge over all old scores, and start afresh, to do business in a businesslike way. Naturally, the newspaper will rejoice greatly over its victory, which will be an additional pill for the other side to swallow. Swallowed it must be, however; and the Directors have the abiding consolation of knowing that there is plenty of "jam" in their new Act to make it go down sweetly.

The Merits of the Workmen's Compensation Act as a Preventive of Accidents.

THE Workmen's Compensation Act has now been in force for over a year; and it might reasonably be thought that the chief political interest in regard to it would centre in the prospect of its enlargement or amendment in the light of experience. This, however, is not the idea of the "Daily "News," which reviewed the year's working of the Act on Thursday last, with the object of proving, by the statistics of accidents, that Mr. Asquith's abortive Act would have been a far better measure. Seeing that the Bill thus commended is as completely relegated to the limbo of impossible schemes of legislation as anything of the kind can well be—something else having taken its place—such an exercise appears to be a work of supererogation. The facts are nevertheless instructive. During the first year of the Act, the number of non-fatal accidents recorded in the "Labour Gazette" was 89,823. For the previous year, they numbered 63,742. This is an increase of 38 per cent. The fatal accidents last year numbered 2461; and for the previous year 2119—increase, 14 per cent. Our daily contemporary argues that these figures mean that the Act, with its corollary of insurance, has put "a terrible "premium upon carelessness;" and the tragic result is said to witness to the wisdom of the Trade Unionists, "in de-"manding a measure of prevention, rather than of com-"pensation, to meet the problem of industrial slaughter." Naturally, as a political "organ," the "Daily News" makes use of these returns to drive home the familiar lesson that Codlin is the true friend of the working man, not

Short. The circumstance that its own Codlin did nothing at all, while the opposition Short at least passed this Act, is merely a detail. We are not going to fall back, in this connection, upon the old saw about figures being amenable to partisan use; but it is at least open to be remarked that accidents should be weighed as well as counted. Now, it is a singular thing, if the operation of the Act has been to increase injuries, fatal and otherwise, that the rates charged for renewals by the Insurance Companies taking this risk should show so marked a fall.

Before the "Daily News" fanned itself into a state of righteous indignation over the iniquity of the framers and workers of the Act—it has called for the (official) blood of the Duke of Devonshire, Mr. Chamberlain, "and of the "entire Cabinet except Mr. Long"—it might have asked how the valuation or risk, as well as the enumeration of the accidents, works out. The plain inference from the reduced cost of insurance is that the expectation of death and injury based upon previous records, has been agreeably falsified. The mere increase in number of accidents is referable mainly to more complete registration—just as the appointment of a new Chief Constable has been known to send up the convictions for drunkenness in a town to a figure calculated to make the local teetotallers give up their cause in despair. This interpretation might be suspected from the abnormal increase in the number of accidents in factories and workshops from 38,555 to 58,628. No sane man will jump to the conclusion that there have actually been all these extra injuries, just because the employers have been made to pay for them. The contemporaneous rise in the tale of railway, mine, and quarry accidents is comparatively small. But then the latter employments have been well looked after in the matter of "returns;" whereas factory and workshop accidents have largely escaped enumeration in the past. The pretension of the Trade Union leaders to the monopoly of a desire to prevent accidents, will not hold good for a moment. They certainly failed to indicate any better means of preventing accidents than that of throwing the burden of compensation upon the employers in the first place. How else are Railway Companies induced to take the utmost care of the travelling British public? Wherefore, after paying every consideration to the figures given by the "Daily News" with the object of condemning the Workmen's Compensation Act, we find that the statistics do not bear out this interpretation, and that the most significant evidence of all in regard to the working of the Act has been left out of the account.

The Duties and Responsibilities of Auditors.

THE warning lesson of the Millwall revelations is not going to be allowed to be forgotten. That lesson is one for the directors, shareholders, and auditors of every company, and cannot be too often recalled to mind. We have, more than once, especially drawn attention to the light thrown by the evidence given at the trial of Mr. Birt upon the view taken by many auditors of their duties and obligations, and upon the absurd futility of the system of examination usually adopted. We are only too well aware of the lamentable apathy of shareholders (even though they be Cabinet or ex-Cabinet Ministers), in regard to this question—an apathy extending, unfortunately, to everything connected with the company in which they are interested except the current dividend. The best hope of securing a more intelligent and enlightened system of audit, seems therefore to lie in the possibility of arousing the attention of the governing bodies of the various associations of professional auditors to the need for reform, and of bringing home to the individual auditor the responsibility entailed upon him.

We, therefore, welcome the appearance, in the current number of the "Accountants' Magazine," of a strong article calling the attention of the profession to "the fact "that many business men have been led by the admissions "made by the Auditors in this trial"—that of the Managing Director of the Millwall Dock Company—"to set a very "low value upon auditing as a safeguard either against "dishonest servants or against the publication of misleading balance-sheets." The writer points to the essential and entirely vitiating weakness of the present system when he asks whether it is "necessary, or recognized to be "right, that any auditor of any concern, however vast, "should place implicit reliance upon the statements or "certificates of any servant of that concern;" and he rightly declares that "if the profession answer that question in the affirmative, they must expect, and they will "deserve, to forfeit the confidence and respect of the investing public." The method suggested for adoption, in place of the present absurd system, is essentially the same as that outlined in the "JOURNAL" in a recent article on the subject—in brief, the method of "auditing samples, it "being impossible to examine the bulk." We hope the article in the "Accountants' Magazine," which is very outspoken in its criticisms, appearing, as it does, in a journal of the profession, editorially commended to "the careful "perusal of every auditor," will have a salutary effect.

Additional point is given to those criticisms by the report which appears in the same issue of the magazine, of an action that was recently brought in the Irish Court of Chancery against the Auditor of the Irish Woollen Company, for the recovery of dividends which, it was alleged, had, through the Auditor not having properly discharged his duty, been paid out of capital, by means of the familiar expedient of over-estimating the value of the stock and debts, and by under-stating the liabilities. The Master of the Rolls "thought it impossible to hold that if Mr. "Kevans (the Auditor) had discharged his duty, this continuous and prolonged course of fraud and loss would "have been possible. . . . . He, Mr. Kevans, was "bound to see that the accounts kept by the Company's "servants accurately represented the state of the facts. "His Lordship failed to find on Mr. Kevans's part the "exercise of any care or skill directed to anything but the "mere frame of the accounts—none whatever applied to "ascertain whether the books accorded with the facts, *or* "*that the balance-sheets, while correctly exhibiting the result of* "*the books, really showed the financial position of the Company.* "He was, therefore, of opinion that there must be a "decree against Mr. Kevans, with costs." The passage italicized is to be commended to the earnest attention of all company auditors. The judgment—against which it is understood, however, that an appeal is to be taken—will be as surprising to many auditors as it is satisfactory to the investing public.

The Working Up of Bye-Products.

A FACT which, in considering the many comparisons drawn between the two chief Metropolitan Gas Companies, has always appeared to us to merit attention and to require explanation, is mentioned by Dr. Bueb, of Dessau, in the paper read by him before the German Association of Gas and Water Engineers on "Gas Purification, with Recovery "of Bye-Products," of which we published an abstract translation last week. We refer to the fact that although (in the words of the author) "the Gaslight and Coke Company "have for some time past worked up the whole of their "bye-products, including their tar, cyanogen, ammoniacal "liquor, and spent oxide, at a gigantic chemical works at "Beckton, whereas the South Metropolitan Gas Company "have only worked up their ammoniacal liquor, and have "sold their other bye-products in the crude state," yet "the Gaslight and Coke Company have not shown that "the working up of their bye-products has given them an "advantage economically over the rival Company." Why is this? The expectation would very naturally be that the Company which is of sufficient magnitude to construct and keep in constant use a chemical works capable of distilling the whole of its make of tar, of manufacturing some 20,000 tons of sulphate annually, and of working up the cyanogen obtainable from the gas into prussian blue and other valuable products, would, by securing not only the profit on the crude products, but also the secondary (the manufacturer's) profits, obtain a much higher return for its residuals than a Company which, on account of its smaller output, is obliged to be content with receiving the first profit only on its tar, and none whatever on its cyanogen. We fancy a very sufficient explanation might be discovered if the products customers of the Gaslight Company could be balloted on the following questions: "What is your "candid opinion of the treatment which the Gaslight and "Coke Company extend to their large buyers of residual "products? Do you ever buy from the Gaslight and "Coke Company if you can possibly avoid doing so?" A tabulation of the replies, even after judicious editing, would, we think, be in the nature of a veritable eye-opener for the Chartered directorate. At all events, while they are cogitating upon the outspoken comments of the recent Select Committee, they might well extend their consideration to this question: Are the Beckton Chemical Works a Failure? If not, where can the gain be found?

WATER AND SANITARY AFFAIRS.

The London County Council brought their year's labours to a close on Tuesday, when they had a long sitting in order to dispose of the various matters contained in a very bulky *agenda*, and leave the members to enjoy their holidays with lightened minds. The size of the *agenda* was increased by the presence of the formidable report by the Water Committee on the quality of the London Water Supply and the condition of the Thames and Lea, to which reference was made last week. It came up in due course; and though notice had been given by Mr. Easton, the member for Fulham, to oppose its reception, nothing seems to have resulted therefrom. The report, however, did not escape criticism. Mr. Beachcroft looked on it as "humiliating," inasmuch as, after placing themselves in opposition to Water Bills of all sorts and kinds, and actually wrecking one which contemplated the execution of important storage works for the supply of the one district of the Metropolis where trouble has arisen from curtailment of the supply, the Committee ask the Local Government Board to give the Water Companies a freer hand in drawing from the Thames. The Committee did not mind thus humiliating themselves, in view, as set forth in their report, of the "considerable anxiety shown by the public as to the "present position of the water supply." But Mr. Beachcroft failed to see any such anxiety displayed, except by the members of the Committee and their Chairman. No alarm has apparently been manifested at the East-end lest there should be a repetition of last summer's troubles; and although an attempt was made on the day of the Council meeting to raise a scare because the water had been cut off for a few hours in St. George's-in-the-East, to allow of the execution of some local repairs, the ubiquitous newspaper reporter was powerless to make the occurrence the text of a half-column attack upon the East London Water Company. One of these gentlemen was actually candid enough to acknowledge that, after diligent inquiry, he "for once" agreed with the explanation Mr. Crookenden, the Company's Secretary, had given. As a matter of fact, the stoppage was necessary to allow of the completion of main-laying work which will materially improve the supply of the district.

But while Mr. Beachcroft failed to see any "public" anxiety as to the water supply, Mr. M'Dougall, the Council's representative on the Thames Conservancy Board, was in a position to inform him that this feeling was very much in evidence at that Board on the previous day with respect to the present condition of the Thames. According to him, the flow of water over Teddington Weir had dropped to 94 million gallons. This is unquestionably very low. Of course, the Companies are drawing heavily upon the Thames; but not to such an extent as to justify the assertion that they are "depleting" it. The necessities of the public must have first consideration; and it is satisfactory to learn from Mr. M'Dougall, that, anxious as the Conservancy are about the river, they do not consider it advisable to take any action which would embarrass the Companies, who, it may here be mentioned incidentally, contribute a by no means insignificant portion of the Board's revenue. Mr. Dickinson, the Chairman of the Water Committee of the County Council, has been calculating the possibilities of the present and next month, on the basis of previous wet and dry years. Supposing they should turn out to be as wet as in 1896, the probable average flow of the river will be somewhere between 150 and 500 million gallons daily; and although a few days ago he presented a somewhat alarmist view as to the future, it is consoling to find that he does not now think there will be a "water famine." Nor do we. The famine cry was raised for a purpose; and now that it has been served, the tone can be judiciously moderated. Mr. Dickinson lays upon Lord Balfour's Commission the responsibility for the present state of things, by putting at much too high a figure the flow of water over Teddington Weir. We can only say that their figure was arrived at, after full inquiry, with the assistance of experts; and we think it must be taken as correct until disproved after a similar investigation. Mr. Dickinson looks upon the report of the Commission as the cause of the neglect by Parliament of the now pressing question of bringing a supply of water from Wales in substitution of that taken from the "polluted and "discredited Thames." On this point it may be replied that Sir F. Dixon Hartland, alluding to the work of the Thames Conservancy, told the House of Commons a few months ago that the river had been purified to such an extent that 500,000 people who in 1884 had polluted water were now drinking a pure supply; and the Commission expressed the opinion that the water as supplied to the consumer in London "is of a very high standard of excel-"lence and of purity, and suitable in quality for all house-"hold purposes." With regard to the Welsh scheme, the Council's Bill to sanction it, which has been in a state of suspended animation since the 21st of March, when the motion for its second reading was rejected, was formally withdrawn last Thursday. However, the Water Bills are to be proceeded with next session; but before the time comes for depositing them, we shall no doubt be in possession of the report of Lord Llandaff's Commission.

A good deal has been made of the circumstance that the Water Companies are taking more water from the Thames than they did this time last year; but equal prominence is not given to the fact that a much larger number of consumers are being served, and that in the hot weather there is a very natural tendency to be lavish—perhaps unnecessarily so—in the use of water. No one would for a moment think of suggesting any restriction to the free employment of this valuable element for all purposes essential for maintaining the health of the individual and of the community at large. But when people talk of 35 gallons per head of the population being sent into a district, the wonder arises how it can possibly be disposed of. As a matter of fact, there is too much reason for supposing that a great deal is wasted. The knowledge that the mere turning of a tap will furnish a copious supply of water is apt to beget extravagant habits. We are not now referring specially to the East-end, which is fortunately much farther removed from a possible shortage of supply than it was this time last year; the East London Company's reservoirs containing twice the quantity of water they then held. But early last week there was an abnormal increase in the draught upon the reserves, which could scarcely be accounted for on the supposition that the water was being used judiciously. In Birmingham, Manchester, and elsewhere, consumers have to be reminded that, in droughty times, it behoves them to be careful in the use of water. Sir John Harwood, the Chairman of the Water Committee of the Manchester Corporation, administered a timely rebuke to some of the citizens a few weeks ago; and he reiterated his warning at the Council meeting last Wednesday. At the present time, there is about 97 days' supply of water in stock, as compared with 120 days' supply a year ago. In the city and district, the consumption of water for the past seven months has been at the rate of 31½ million gallons a day, against 29½ million gallons in 1898. Although Sir John talked about 97 days' supply, he was careful to point out that in 30 days the water would be of inferior quality. He therefore urged the consumers to practise a little economy, and reminded them that wastefulness always brings its own terrible reward. Not only is the consumption of water increasing rapidly in Manchester itself, but a larger quantity is being taken from the Thirlmere pipe for the supply of the Local Authorities on the route. At Wigan, the average daily consumption has gone up from 1,126,000 gallons on May 1 to 1,562,680 gallons last Tuesday—an increase which the Chairman of the Water Committee of the Corporation characterizes as alarming. He feels confident that a large quantity of that water must have been run away to no purpose; and he echoes Sir J. Harwood's advice to the consumers. The above observations are not made in detraction of the management of corporation water undertakings, or as "holding a brief" for the Water Companies, as the "St. James's Gazette" put it last Friday in a well-written article on "The Bogus Water Famine," but simply to bring out the point that periods of unusually hot and dry weather tax in an exceptional degree the resources of all suppliers of water, whether they are companies or corporations, and to suggest that their difficulties should not be increased by wastefulness on the part of the consumers.

Rateable Property.—In the House of Lords last Thursday, a return was ordered showing the rateable value of property, including gas and water works, in each Union in England and Wales.

THE PRIZE ESSAY ON SULPHATE OF AMMONIA.

THE UTILITY OF SULPHATE OF AMMONIA IN AGRICULTURE.

By James Muir, M.R.A.C.

(*Concluded from p.* 292.)

TURNIPS AND SWEDES.

Following the order adopted in considering other crops, the experiments at Rothamsted on the continuous growth of swedes, from 1856 to 1871, may first be examined. The manuring of the plots was not absolutely the same all through the experiment; nitric acid and sawdust being used in place of nitrate of soda for the first five years. For the sake of brevity, however, we will speak of these plots as receiving nitrate of soda.

The following table shows the weight of roots per acre per annum produced by various manures:—

Table XXIX.

Manures.	Alone.	With Ammonia Salts.	With Nitrate of Soda.
	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.
Farmyard manure	6 4	8 8	7 9
Do., and superphosphate	6 7	8 5	7 13
Unmanured	0 11	0 13	0 19
Superphosphate	2 12	3 16	4 13
Superphosphate each year, and sulphate of potash for first five years.	2 7	4 5	4 11

The results are generally similar to those already noticed in the case of mangels. With farmyard manure, ammonia salts were undoubtedly more effective than nitrate of soda; while without farmyard manure, nitrate was in every instance superior to ammonia salts in the weight of roots it produced. The effect of potash, when used with superphosphate and a nitrogenous manure, was just what we have seen so often with regard to other crops—tending, if anything, to diminish the yield when nitrate was used, but increasing if with ammonia salts.

Passing on to experiments on turnips grown under ordinary farm conditions, an important series, carried out in Banffshire,* under the direction of the Highland and Agricultural Society, in 1893-4, may be taken as an example. The following are the results, so far as they concern the present subject, obtained on the various plots for each of the years of experiment. The results of 1893 are the average of 25 experiments where artificials only were used, and of 15 where farmyard manure was also employed. Those of 1894 are the averages of 22 and 16 experiments respectively.

Table XXX.

—	1893.		1894.		Average.	
	With Sulphate of Ammonia.	With Nitrate of Soda.	With Sulphate of Ammonia.	With Nitrate of Soda.	With Sulphate of Ammonia.	With Nitrate of Soda.
	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.
Bone meal . .	18 17	17 15	17 5	15 7	18 1	16 11
Superphosphate	21 16	20 7	18 13	18 0	20 4	19 3
Bone meal and farmyard manure . .	22 2	20 19	17 12	18 1	19 17	19 10
Superphosphate and farmyard manure . .	24 4	23 7	18 1	19 17	21 2	21 12

In 1893, with each kind of additional manure, sulphate of ammonia gave distinctly better results than nitrate of soda; and in 1894, sulphate was also more efficient when used with artificials only. With farmyard manure, however, contrary to what we should expect, nitrate gave a better return, so that on the average of the two years it yielded half a ton more roots with superphosphate and farmyard manure, though with bonemeal and farmyard manure it was still 7 cwt. inferior to sulphate of ammonia.

* "Transactions of the Highland and Agricultural Society," Vols. VI. and VII., Fifth Series.

This is another example of the comparatively better effect of superphosphate and nitrate than of superphosphate and sulphate. It is unfortunate that this series of experiments did not include plots dressed with potash; for it would have been interesting to see whether, as with other crops, the addition of potash to the other manures would have increased the yield where sulphate was used to a greater extent than with nitrate.

The effect of season has much to do with the question of the relative economy of sulphate of ammonia and nitrate of soda on the turnip crop. Thus, in a similar experiment to the above, carried out in the year 1892*—not included with the results of 1893-4 because the manurings tested were not exactly similar—sulphate of ammonia with bone meal gave 10 cwt. more roots than nitrate; but with superphosphate, nitrate produced 9 cwt. more than sulphate, a result less favourable to sulphate of ammonia than those of 1893-4.

Another interesting comparison was afforded by the experiments of the Norfolk Chamber of Agriculture in 1886† with swedes. The following were the weights of roots grown on the different plots named per acre on the average of three farms:—

Table XXXI.

Mineral Manures.	Alone.	With 1½ Cwt. Sulphate of Ammonia.	With 1½ Cwt. Nitrate of Soda.
	Tons. Cwt. Lbs.	Tons. Cwt. Lbs.	Tons. Cwt. Lbs.
Superphosphate, 4 cwt.	14 2 97	17 5 56	16 14 74
Do. with sulphate of potash, 2 cwt. . . .	15 4 31	18 14 19	18 8 48

The effect of potash with superphosphate and nitrate of soda was rather greater than we have seen in other instances. Sulphate of ammonia, however, whether with or without potash, gave a larger weight of roots than nitrate.

One more instance may be quoted as showing how the relative effects of sulphate and nitrate vary according to the manures with which they are used. The following results were obtained as the average of two experiments carried out in 1897 under the direction of the Yorkshire College. The figures relating to rape dust are included for comparison:—

Table XXXII.

	With ¾ Cwt. Sulphate of Ammonia.	With 1 Cwt. Nitrate of Soda.	With 3 Cwt. Rape Dust.
	Tons. Cwt. Lbs.	Tons. Cwt. Lbs.	Tons. Cwt. Lbs.
Farmyard manure, 15 tons; kainite, 4 cwt. .	19 17 6	19 8 84	18 3 104
F. M., 15 tons; K., 4 cwt.; superphosphate, 3 cwt.	20 1 8	21 4 48	20 1 48
F. M., 15 tons; K., 4 cwt.; bone meal, 5 cwt. . .	20 15 80	20 1 48	20 1 8
F. M., 15 tons; K., 4 cwt.; basic slag, 6 cwt. . .	18 2 16	19 17 56	17 15 80
F. M., 15 tons; K., 4 cwt.; dissolved bones, 4 cwt.	23 4 72	19 3 24	20 9 32
F. M., 15 tons; K., 4 cwt.; superphosphate 2 cwt.; bone meal, 2 cwt. . .	22 3 64	19 15 40	20 11 48
F. M., 15 tons; superphosphate, 2 cwt.; bone meal, 2 cwt. . .	20 1 8	18 5 40	19 17 20
Average . . .	20 12 20	19 13 80	19 11 48

On the average, the seven plots dressed with sulphate of ammonia produced about a ton per acre more roots than the nitrate plots; and the rape dust plots were about equal to the latter. Looking at the results of the individual plots, we see that in only two cases out of the seven did nitrate give a higher yield than sulphate. Of these one was the plot receiving superphosphate, which confirms what we have already noticed; and the other was the basic slag plot, where possibly some of the nitrogen of the sulphate of ammonia may have been lost through the action of the lime of the slag. This high produce of

* "Transactions of the Highland and Agricultural Society," Vol. V., Fifth Series.

† "Journal of the Royal Agricultural Society of England." Vol. XXIII., S.S., Part I.

sulphate of ammonia with dissolved bones, compared with nitrate is worth noticing; for the results of many experiments seem to show that the use of dissolved bones with sulphate of ammonia gives particularly good returns.

In ordinary farm practice, the use of sulphate of ammonia adds very much to the weight of the crop, and to the extent of about 1 cwt. per acre may be relied on to repay its cost and leave a profit. As we have seen with other crops, potash manuring seems peculiarly helpful to its action. The sulphate should be applied at the time of sowing, and will generally be found to give particularly good results in seasons in which growth goes on late in the year. It has been noted by many experimenters that turnips grown with sulphate of ammonia are more healthy, and keep better, than those grown with nitrate. This is to be expected from what we have already said as to the effect of the manures on the rankness of growth of all crops.

POTATOES.

The Rothamsted experiments naturally claim first attention with this, as with the other crops we have dealt with. For the first twelve years of experiment in the continuous growth of potatoes on the same land, the following were the average weights of potatoes of different qualities per acre per annum, and the percentage of diseased tubers produced by various manurings.*

TABLE XXXIII.

	Good.	Small.	Diseased.	Total.	Diseased in Total.
	Tons. Cwt.	Ton. Cwt.	Ton. Cwt.	Tons. Cwt.	Per Cent.
Unmanured . . .	1 13½	0 5	0 1¼	1 19¾	3·15
Mineral manures .	3 7⅝	0 4⅞	0 2⅜	3 15¼	3·45
Minerals and ammonia salts . .	5 18⅞	0 7¼	0 8⅜	6 14½	6·26
Minerals and nitrate of soda . .	5 17⅜	0 6⅜	0 9¼	6 13	7·00

Compared with the corn crops, we see here a relatively large increase from the use of mineral manures alone; but still the nitrogenous manures gave a large further increase. The produce is slightly higher with ammonia salts than with nitrate of soda, both in total weight and in good marketable potatoes.

The figures relating to disease are also interesting. As would be expected, the proportion of diseased potatoes is higher in the heavier crops grown by the use of nitrogenous manures; but it is important to notice that the crop grown with nitrate was, on the average, more diseased than that with ammonia salts. This, however, harmonizes with what we know of the effects of the two manures on plant growth generally.

Some interesting experiments were carried out by Voelcker in 1868 and 1869, on the growth of potatoes in rotation.† In each year the experiment was carried out on two farms. The following table gives the average results per acre in each of the two years, and on the average of both:—

TABLE XXXIV.

Manures.	1868.	1869.	Average.
	Tons. Cwt. Lbs.	Tons. Cwt. Lbs.	Tons. Cwt. Lbs.
Unmanured	4 10 33	6 11 56	5 10 100
Superphosphate and potash salts	7 5 100	8 5 2	7 15 51
Superphosphate, potash salts, and sulphate of ammonia .	9 0 106	10 4 49	9 12 77
Superphosphate, potash salts, and nitrate of soda . . .	7 9 12	9 11 110	8 10 61
Farmyard manure	8 9 51	9 17 21	9 3 36

The potash salts were in some cases crude potash salts, and in others muriate of potash. Equal weights—2 cwt. per acre—of sulphate of ammonia and nitrate of soda were used; so that the sulphate plots received more nitrogen than those dressed with nitrate.

The average results of the two years are very similar, and to a great extent repeat what we have seen in the Rothamsted results. But most noticeable is the superiority of sulphate of ammonia used with superphosphate and potash salts, not only over nitrate of soda with the same minerals, but to a less extent over farmyard manure.

The two artificial nitrogenous manures gave similar results in an experiment carried out in Anglesey in 1893, under the University College of North Wales, on a poor, free-working soil on a clay subsoil. In this case, also, equal weights of the manures were employed—1 cwt. per acre—so that the sulphate of ammonia supplied more nitrogen than the nitrate of soda by about 5 lbs. per acre. The following were the weights of potatoes grown per acre:—

TABLE XXXV.

Manures.	Alone.	With Sulphate of Ammonia.	With Nitrate of Soda.
	Tons. Cwt. Lbs.	Tons. Cwt. Lbs.	Tons. Cwt. Lbs.
Superphosphate, 3 cwt.; sulphate of potash, 2 cwt.	..	8 17 96	4 14 32
Farmyard manure, 15 tons; superphosphate, 3 cwt.; sulphate of potash, 2 cwt. . . .	8 7 16	10 14 13	9 15 0
Average . . .	..	9 15 110	7 4 72

The difference in favour of sulphate of ammonia when artificials only were used is remarkable, and is possibly partly due to accidental circumstances. That an actual superiority of sulphate of ammonia was shown in this experiment, may be inferred from the fact that the highest produce of any of the plots—many of which are not included above—was that from sulphate of ammonia with farmyard manure and minerals. Nitrate of soda was used in a number of different combinations, but at best gave a crop nearly 7 cwt. worse than the best sulphate crop.

So as to avoid giving a partial view of the case, one other experiment may be quoted. This was carried out on two farms in Cumberland and Durham, in 1896, under the direction of the Durham College of Science. The artificial nitrogenous manures, it must be noticed, were employed so as to give equal quantities of nitrogen, not in equal weights of the manures. The following are some of the results obtained:—

TABLE XXXVI.

Manures.	Large.	Small.	Total.
	Tons. Cwt.	Ton. Cwt.	Tons. Cwt.
Unmanured	4 15	0 10½	5 5½
Farmyard manure, 12 tons . . .	8 1½	0 17	8 18½
F.M., 12 tons; superphosphate, 5 cwt.; kainite, 5 cwt.	7 15¾	0 19	8 14¾
F.M., 12 tons; S., 5 cwt.; K., 5 cwt.; nitrate of soda, 1½ cwt. . . .	9 2	0 11¾	9 13¾
F.M., 12 tons; S., 5 cwt.; K., 5 cwt.; sulphate of ammonia, 1½ cwt. .	9 1¼	0 13	9 14¼
F.M., 12 tons; S., 5 cwt.; S.A., 1½ cwt.	9 8¾	0 11¾	10 0½
F.M., 12 tons; K., 5 cwt.; S.A., 1⅛ cwt.	8 18¾	0 15¼	9 14

With a full mineral manuring, sulphate of ammonia and nitrate of soda gave practically equal results. More exceptional, however, is the fact that the omission of kainite from the full manuring containing sulphate of ammonia caused a distinct increase in the produce. Possibly a lighter dressing of kainite would have given a better return than either the amount applied or the total omission of potash manure.

The composition of potatoes grown with various manures is chiefly important to the farmer when they are to be used for feeding stock. It is, however, worth mentioning that, just as we have seen with mangels, that the amount of sugar produced per acre is greater by manuring with ammonia salts than with nitrate of soda, when farmyard manure is also applied to the crop, so with potatoes we find that the chief feeding material they contain—starch—is formed in larger quantity per acre with ammonia manures than with nitrate. The amount of starch per acre per annum in the crops on some of the plots at Rothamsted,

* "Agricultural Students Gazette," New Series, IV., 2.

† "Journal of the Royal Agricultural Society of England." Vol. VI., S.S.

on the average of ten years—1876 to 1885—was as follows:—

TABLE XXXVII.

No manure	1,120 lbs. starch
Mineral manures	1,988 ,,
Minerals and ammonia salts	3,436 ,,
Minerals and nitrate of soda	3,368 ,,

The difference between the two plots receiving nitrogenous manures, though not very large—68 lbs. of starch per acre—is still distinctly in favour of ammonia salts.

Comparing all the evidence at our disposal, we may safely conclude that, in practice, sulphate of ammonia will prove the best nitrogenous manure for potatoes, and will often give highly remunerative results. The quantity used will, of course, vary according to the condition of the land and the other manures employed; but it should usually be between 1 and 2 cwt. per acre.

BEANS.

This plant is a member of the natural order Leguminosæ, and, like other leguminous plants, has the special power already noticed of obtaining the nitrogen it requires from the air by means of the bacteria in the nodules on its roots. As we should expect, therefore, it benefits less from the application of nitrogenous manures than any of the other crops we have noticed. The number of field experiments with beans bearing on our subject is small, and may be dealt with in few words.

In experiments on the continuous growth of beans, Sir John Lawes and Sir Henry Gilbert found that nitrate of soda produced greater effect than ammonia salts, but that mineral manures were more important than either in their influence on the yield. In opposition to this, Hellriegel* found sulphate of ammonia more effective on the leguminous crops generally than nitrate of soda.

On the whole, however, the conclusion cannot be avoided that no nitrogenous manure will prove economical for application to beans; and the subject need not be further discussed.

CLOVER.

With this leguminous plant, as with beans, nitrogenous manures are often of little use; but the evidence afforded by experiment is not quite so consistent as in the case of beans.

In an early experiment at Rothamsted, the average produce of red clover hay per acre, from six plots, manured in various ways, or left unmanured, was 4 tons 7 cwt. 76 lbs.; while six similar plots, receiving exactly the same manures, but with the addition of ammonia salts to each, only averaged 4 tons 4 cwt. 3 lbs.—a falling off of about 3¼ cwt. On the other hand, in the attempted continuous growth of clover at Rothamsted, the produce of hay per acre on the average of the seven crops grown in 29 years was, with mineral manures only, 4171 lbs. per acre, and with mineral manures and nitrogenous manures in addition, 4555 lbs. per acre—a gain of about 3⅓ cwt. from the use of the nitrogenous manures.

Somewhat more favourable results have sometimes been obtained. For instance, Von Knieriem* found, on the average of two seasons, an increase in the clover crop of 52 per cent. by the use of sulphate of ammonia and superphosphate, against 30 per cent. increase with superphosphate only. In the former case, the benefit of the manuring extended into the second year; but with superphosphate only, no effect was perceptible after the year of application.

The general conclusion arrived at as the result of experiment is that, though nitrogenous manures often give an appreciable increase when applied to the clover crop, yet they are very uncertain in their action, sometimes actually diminishing the crop. In any case, they rarely prove economical; the cost of the manure usually exceeding the value of the extra produce.

GRASS LAND.

The effect of any manuring on grass land is particularly difficult to estimate, for mere bulk of produce is only one of several factors—such as the botanical composition, the feeding value, and the readiness with which stock eat the grass. We will first consider the effect of sulphate of ammonia on the weight of the crop only.

* "Ann. der Landw.," VII. and VIII. † "Bied. Centr.," 19.

INFLUENCE OF SULPHATE ON WEIGHT OF PRODUCE.

At Rothamsted, in the first twenty years of experiment, the following were the average weights of hay per acre per annum, produced on the plots mentioned:—

TABLE XXXVIII.

Unmanured	21¼ cwt.
Mineral manures	35¼ ,,
Minerals and ammonia salts	51 ,,
Minerals and nitrate of soda	57 ,,

Both the nitrogenous manures gave a very large increase when used with minerals; but nitrate of soda produced considerably more hay on the average than ammonia salts. In comparing these two manures in order to estimate their use on the farm, however, we must remember that, used over a long series of years in large quantities, ammonia salts cause a heavy loss of lime from the soil, and especially in the case of grass land; the land therefore becomes sour and unfavourable for plant growth. Thus at Rothamsted, after a time, the soil of plots dressed with ammonia salts became so sour that in 1881 part of each plot was dressed with chalk, to sweeten the land and replace the lime which had been lost. The effect of this was to increase the yield of these plots, and check the deterioration which had occurred up to that time. In ordinary farm practice, this souring of the soil would not occur to the same extent; and the two manures, sulphate and nitrate, would act under more equal conditions. We see this in the average results for the first seven years of experiment on the plots at Rothamsted mentioned above. The average produce of hay per acre per annum for that period was—

TABLE XXXIX.

Unmanured	25½ cwt.
Mineral manures	35 ,,
Minerals and ammonia salts	56¾ ,,
Minerals and nitrate of soda (five years only)	51½ ,,

At first, then, ammonia salts gave the higher produce; but owing to their continuous application, the crop became unhealthy, so that over the longer period nitrate produced the heavier average yield.

Generally, therefore, in experiments on grass land on the continuous use of manures, we find that nitrate gives the higher yield of grass or hay per acre. Thus in the experiments carried out by the Highland and Agricultural Society, at Pumpherston, nitrate with superphosphate and potash salts gave an average of 35·4 cwt. of hay, against 32·8 cwt. yielded by sulphate of ammonia with the same mineral manures. In the grass experiments at the Royal Agricultural College, Cirencester, a full manuring containing nitrate produced more hay than one containing sulphate of ammonia, though the average of all the plots dressed with sulphate was higher than that of the plots receiving nitrate. It may be noticed, in passing, that in the Cirencester experiments potash manures seemed to have an unfavourable effect on the action of sulphate of ammonia, but to have assisted that of nitrate of soda.

Passing on to experiments on land in ordinary farming condition, the evidence is somewhat conflicting. In some experiments carried out in 1894, under the direction of the Durham College of Science, on six farms in Durham and Northumberland, the following weights of hay were obtained:—

TABLE XL.

No manure	37¾ cwt.
Superphosphate and kainite	43¼ ,,
Superphosphate, kainite, and sulphate of ammonia	45½ ,,
Superphosphate, kainite, and nitrate of soda	46¼ ,,

Nitrogenous manures here gave a very small increase when added to minerals; nitrate being slightly better in this respect than sulphate of ammonia.

Similar results were obtained on nine farms in Cumberland, in 1895 and 1896, when the following average weights per acre per annum were obtained:—

TABLE XLI.

No manure	17⅞ cwt.
Basic slag, kainite, and sulphate of ammonia	25 ,,
Basic slag, kainite, and nitrate of soda	25⅜ ,,

On the other hand, in an experiment carried out on

twelve farms in Yorkshire, under the direction of the Yorkshire College, the following average weights of hay per acre were obtained from the application of the manures mentioned:—

TABLE XLII.

Manures.	Alone.	With Sulphate of Ammonia.	With Nitrate of Soda.	With 10 tons Farmyard Manure.
	Cwt.	Cwt.	Cwt.	Cwt.
Unmanured	26	31¼	27¼	30
Superphosphate, 3 cwt.	23¾	33	31¼	30½
Bone dust, 3 cwt.	23¼	33¼	30½	32
Kainite, 3 cwt.	25¾	33¼	31½	33½
Superphosphate, 3 cwt.; kainite, 3 cwt.	27¾	36¾	34¼	36
Dissolved bones, 3 cwt.	25½	37	33¾	37¾
Average	25¼	34	31½	33¼

Equal weights of sulphate of ammonia and nitrate of soda were used—1 cwt. in each case—so that more nitrogen was applied to the sulphate plots. The season was, on the whole, unfavourable to the action of artificial manures; and it is a curious result that of the plots dressed with non-nitrogenous manures, all but one yielded less hay than the unmanured land, the exception being the plot receiving superphosphate and kainite. Nitrogenous manures in every case gave a marked increase; and in each of the six sets of comparable plots sulphate of ammonia produced a heavier crop than nitrate of soda—the average produce being 2½ cwt. of hay in favour of sulphate.

The figures relating to farmyard manure are given for comparison. It is remarkable that in a season apparently more favourable for the action of farmyard manure than for that of artificials, the average produce from sulphate of ammonia should be slightly higher than that from farmyard manure; and not only on the average, but in four of the six sets of comparable plots, sulphate gave the heavier yield, and in a fifth set the two manures produced equal crops.

As a matter of course, the residue left after the crop was removed would be far greater in the case of farmyard manure; but against this must be put its high cost and expense of applying, in all probability five or six times the cost of using a hundredweight of sulphate of ammonia. In this instance, there is no question that sulphate of ammonia paid better than farmyard manure.

Comparing the farmyard manure plots with the nitrate plots, we find that in every case but one the former gave the best results; superphosphate and nitrate being the only exception.

We may therefore conclude that, though varying in its effect under different conditions, sulphate of ammonia compares favourably in its effects on grass land with any other nitrogenous manure. If used in large quantities at short intervals, it will certainly make the land sour after a time, by causing loss of lime as already explained; but it is not in this way that farmers need to use it. In practice it should rather be applied occasionally to supply nitrogen in an effective and economical form, not to displace altogether farmyard or mineral manures, which supply other essential constituents of plant food.

THE INFLUENCE OF SULPHATE ON THE BOTANICAL COMPOSITION OF THE HERBAGE.

It has been shown clearly in the Rothamsted and other experiments that continuous manurial treatment of any kind invariably has a marked influence on the botanical composition of the herbage. Thus, continuous use of nitrogenous manures had, by the seventh year of the Rothamsted experiments, so strengthened and encouraged the growth of the grasses that the clovers and other leguminous plants had practically disappeared. At the same time, a change of character took place in the plants which were present; a large proportion of leaf, and comparatively few stems and seeds, being produced. The plants were also late in coming to maturity, apparently later with ammonia salts than on the plots manured with nitrate of soda.

The following table* shows the principal grasses found on plots variously manured in the seventh season of experiment, and the weight of each per cent. in the hay crop of that year:—

TABLE XLIII.

	Unmanured.	Mineral Manures.		
		Alone.	With Ammonia Salts.	With Nitrate of Soda.
Downy and yellow oat grasses	11·1	16·7	18·1	4·8
Rough and smooth stemmed meadow grasses	2·7	6·7	12·7	17·1
Perrenial rye grass	6·6	3·0	11·9	10·0
Common bent grass	7·1	2·8	11·6	1·8
Yorkshire fog	4·9	4·9	11·1	6·7
Cocksfoot	3·5	2·8	5·0	11·6
Soft brome-grass	0·1	0·6	2·2	9·4
Hard and meadow fescues	15·0	12·8	4·3	2·6
Tall oat grass	2·0	5·3	0·1	3·1
Total graminaceous herbage	74·1	66·4	89·7	89·7
Total leguminous herbage	6·9	24·1	0·1	0·9
Total miscellaneous herbage	19·0	9·5	10·2	9·4

The increase of the grasses and diminution of clover and other leguminous plants, by the use of nitrogenous manures is very remarkable; and almost equally so is the difference in effect of ammonia salts and nitrate of soda on individual species. Thus, ammonia salts had greater effect than nitrate of soda in encouraging the downy and yellow oat grasses, common bent grass, and to a lesser extent Yorkshire fog, and the fescues; while nitrate increased the meadow grasses, cocksfoot, and soft brome grass more than ammonia salts.

Similar results were obtained in the Highland and Agricultural Society's experiments at Pumpherston*. A mixture of grass seeds was sown in 1887, and careful observations were made year by year as to the proportion of the different plants surviving on each of the variously manured plots. The following table shows the number per cent. of each species in the seed sown; the number of plants of each species, per cent., growing in 1893, the last year of the experiment, on three differently treated plots; and the weight per cent. of produce of each species on the same plots on the average of the three years 1891-3. The column No. 1 gives the results of the plots receiving no manure, No. 2 those of the plot manured with phosphates and potash, and No. 3 those of the plot to which sulphate of ammonia was given in addition to phosphates and potash.

TABLE XLIV.

	Number Per Cent. of Seeds Sown.	Number of Plants, Per Cent., 1893.			Weight Per Cent., Average, 1891-3.		
		1	2	3	1	2	3
Perennial ryegrass	5·3	10·5	7·8	5·6	6·0	4·2	3·0
Cocksfoot	11·0	22·8	26·6	27·8	34·0	53·0	51·0
Timothy	13·0	3·3	1·7	1·1	5·0	6·0	3·3
Dogstail	2·6	15·1	12·1	16·5	26·0	17·0	21·0
Foxtail	7·3	..	0·3	1·7	..	0·3	2·0
Meadow grasses	28·0	2·1	2·6	1·5	0·7	1·4	0·7
Fescues, meadow, and tall	6·6	6·1	4·8	3·7	11·0	6·0	3·5
Fescues, sheep's and hard	6·4	22·2	10·3	3·0	4·0	2·0	0·7
Yorkshire fog	..	15·4	25·4	31·7	8·5	10·0	12·5
Clover	19·0	2·5	6 5	3·7	0·5	1·1	0·6
Weeds	..	..	1·9	2·0	..	0·1	0·4

In no case did the species appear at the end of the experiment in the same proportions as in the seed. Speaking generally, cocksfoot, dogstail, and the weed grass, Yorkshire fog, had largely increased, and most of the other grasses and clover had diminished. But the extent of this increase and decrease is very different in the different plots. Thus, considering the weight of the produce, cocksfoot increased much more in the manured than in the unmanured plots, but dogstail was more important relatively in the latter case. Ryegrass had somewhat increased in proportion on the unmanured land, but had diminished on the other plots—chiefly on that receiving sulphate of ammonia.

* "Journal of the Royal Agricultural Society of England," Vol. XXIV.

* "Transactions of the Highland and Agricultural Society," Vol. VI., Fifth Series.

Influence on Palatability and Feeding Value.

More important than the changes in the botanical composition of the herbage is the palatability of the produce for stock, and its feeding value to the animal when eaten. On these points there is little reliable information, owing to the difficulty of such inquiries. At the close of the Pumpherston experiments (some of the results of which have just been given), the whole of the area of experiment was grazed; and several times during the season the extent to which the different plots were fed down was estimated. The following were the averages of these estimates; 100 representing that the crop was fed down as close as possible, 50 that 50 per cent. had been eaten, and so on:—

Table XLV.

Unmanured	45 p.c.
Superphosphate	65 ,,
Potash salts	78 ,,
Sulphate of ammonia, phosphates, and potash	47 ,,
Nitrate of soda, phosphates, and potash	27 ,,

The stock evidently preferred the crops grown without nitrogen; but from a farmer's point of view, the small bulk usually obtained from the use of mineral manures only makes such dressings undesirable. The difference between sulphate and nitrate is considerable, and, taken in conjunction with the yields from these plots (nitrate 35·4 cwt. of hay, sulphate 32·8 cwt.), shows a decided superiority in the effect of sulphate of ammonia.

One other experiment bearing on this point may be mentioned, though it has not been carried far enough yet to give very reliable results. On the Northumberland County Council Farm, plots of poor grass land manured in various ways were grazed in 1897 by sheep, and the increase in live weight noted on each plot. In the four months of experiment, the following live weight increases were obtained per sheep and per acre:—

Table XLVI.

Manuring in 1897.	Live Weight Increase.	
	Per Sheep.	Per Acre.
	Lbs.	Lbs.
No manure	14·0	37·3
Superphosphate, 7 cwt.	21·1	56·3
Superphosphate, 7 cwt.; sulphate of potash, 1½ cwt.	27·1	72·3
Superphosphate, 7 cwt.; sulphate of ammonia, 97 lbs.	29·6	79·0

This is an experiment which obviously needs to be repeated frequently before it would be safe to generalize from the results obtained; but as they stand, the above figures point to a striking increase in feeding value per acre, resulting from the use of sulphate of ammonia with superphosphate. A number of manurings were tested in the same way; but this gave the highest live weight increase.

In the following year, however, when the same plots were again grazed with sheep, but no further manure was applied, sulphate of ammonia and superphosphate gave comparatively poor results. The produce was still not far short of double that of the unmanured plot; but the mineral manures—particularly basic slag—gave relatively much better results. This is very much what we should expect from the consideration of the principles controlling the action of sulphate of ammonia. A residue is left beyond the first year after application; but a considerable loss of nitrogen takes place by drainage, especially during the winter. This loss is less in the case of grass land than from arable; but still sulphate of ammonia cannot be expected to produce relatively good results when compared with mineral manures, the valuable constituents of which are held safely by the absorptive power of the soil. That the time elapsed since the sulphate of ammonia was applied had some influence in causing the inferior returns in the second year of experiment, seems more probable from the fact that in the autumn and early winter of 1897-8, when all the plots were grazed by store cattle, the plot manured with sulphate of ammonia and superphosphate carried the largest amount of stock; being equalled only by that dressed with half a ton of basic slag. So that up till then at least, it was still doing well.

It will be noticed that, in these Northumberland experiments, no other purely nitrogenous manures were employed; so that no further light is thrown on the effect of sulphate of ammonia compared with nitrate of soda.

The available experiments, therefore, all seem to show that sulphate of ammonia has a good effect on the feeding value of the crop, besides giving a large increase in its bulk. Used occasionally, and in moderate quantity—say, from 1 to 1½ cwt. per acre—the necessary minerals being also present in the soil or manure, sulphate of ammonia will give a better result on the average than any other purely nitrogenous manure, if both the quantity and the quality of the produce be taken into account.

We have now considered the general principles involved in the use and action of sulphate of ammonia, and its effect on the chief farm crops individually, as shown by experiment. The conclusion arrived at is that, when used judiciously, sulphate of ammonia is a most valuable nitrogenous manure. But it must be repeated that it supplies only nitrogen to crops, and therefore cannot be used with good effect unless phosphates, and usually potash also, are added to the soil. These mineral manures may often be applied to one crop in the rotation, and sulphate of ammonia to another; and the minerals may be given as artificials or as farmyard manure, or partly in one form and partly in the other. But at some time in a series of years, and in one or other form, minerals must be given, or the use of nitrogenous manures cannot prove satisfactory.

Summary.

1.—Sulphate of ammonia is a nitrogenous manure, and must be considered as a source of nitrogen only.
2.—Nine other elements besides nitrogen are essential for plant growth, of which phosphates and potash, as well as nitrogen, must usually be supplied in the manure.
3.—Combined nitrogen only can be used by plants.
4.—Combined nitrogen in Nature is supplied to the soil only in small quantities, and is subject to constant loss. The addition of nitrogenous manures is therefore needed.
5.—Nitrogenous manures cause larger leaf growth, increased chlorophyll formation, slower maturity, and increased crops generally.
6.—Organic nitrogen is of no direct use to the plant. Nitric and ammoniacal nitrogen are both directly useful, though the latter almost always undergoes nitrification before use.
7.—Ammoniacal manures generally fail to give their maximum result unless potash is liberally supplied by soil or manure.
8.—Sulphate of ammonia reacts in the soil with carbonate of lime, and carbonate of ammonia is formed, which can then be fixed by the clay and humus of the soil.
9.—Nitrogen may be lost by the volatilization of carbonate of ammonia, when sulphate of ammonia has been applied to very calcareous soils; but this is rarely important.
10.—Nitrification of ammonia compounds, especially sulphate of ammonia, may be very rapid when everything is favourable. It is more rapid than the nitrification of organic nitrogenous matter.
11.—After nitrification, the nitrogen is subject to loss by drainage.
12.—Sulphate of ammonia is most effective in wet climates and seasons.
13.—A small dressing of sulphate of ammonia may be applied to autumn sown crops in autumn, but most of it should be put on in spring. For all other crops, it should be used at, or a little before, the time of sowing the seed. If applied late in the growth of the crop, sulphate of ammonia may cause too great rankness.
14.—Sulphate of ammonia may be applied longer before sowing on heavy land than on light. It is less suitable for very calcareous soils than for either sandy or clay soils, and still less so for soils deficient in lime.
15.—Sulphate of ammonia may leave a valuable residue in the soil after the removal of the crop to which it is applied.

16.—Too large a dressing of sulphate of ammonia causes injury from over-rankness of growth and late maturity, especially if mineral plant food be deficient in the soil.

17.—Sulphate of ammonia should be mixed with dry ashes, sand, &c., for convenience of sowing, or with other manures, except those which contain lime or carbonate of lime, or which are damp.

18.—Commercial sulphate of ammonia should be of 95 to 97 per cent. purity, containing about 24 to 25 per cent. of ammonia. The chief impurities, apart from sandy matter, are common salt, sulphate of soda, sulphate of iron, sulphuric acid, and thiocyanate of ammonia, of which the last two are most injurious.

19.—On wheat, sulphate of ammonia increases the quantity of the produce and improves its quality. About 1 cwt. per acre should be given.

20.—On barley, sulphate of ammonia gives large increase, and on the average produces a better malting sample than other nitrogenous manures. Average dressing, ¾ cwt. to 1 cwt. per acre.

21.—On oats, sulphate of ammonia usually yields a larger increase of grain than nitrate of soda, and of straw also if potash be plentifully supplied. Average dressing, about 1 cwt. per acre.

22.—On mangels, when farmyard manure is used, sulphate of ammonia is probably superior to nitrate of soda in produce per acre of food for stock, and often in weight of crop. Without farmyard manure, it has rather less effect. Average dressing, 1 to 2 cwt. per acre.

23.—On turnips, sulphate of ammonia compares favourably with nitrate, giving as large or larger crops, which apparently keep better. Average dressing, about 1 cwt. per acre.

24.—On potatoes, sulphate of ammonia gives very large increase—almost always larger than that from nitrate of soda. Sulphate is also less favourable to the development of disease. Average dressing, 1 to 2 cwt. per acre.

25.—On beans, sulphate of ammonia does not give any profitable result.

26.—On clover, sulphate of ammonia is as effective as other nitrogenous manures, but is rarely profitable.

27.—On grass land, sulphate of ammonia produces a yield in weight about equal to, or slightly less than, nitrate of soda. It specially encourages the grasses at the expense of the clovers. The produce seems to be more palatable to stock than that of nitrate of soda, and to have a high feeding value. Average dressing, 1 to 1½ cwt. per acre.

NOTE.—In the above summary, all comparisons between sulphate of ammonia and nitrate of soda are between equal quantities of nitrogen in the two forms. This is equivalent to comparing the effect of a little over ¾ cwt. of sulphate with that of 1 cwt. of nitrate.

Enamels that Expand with Metals.—The great difficulty hitherto experienced with cast or wrought iron objects coated with enamel is the unequal expansion and contraction of the two substances, causing a splintering of the enamel; but we learn from the "Journal of the Society of Arts" that M. Sagliot lately brought before the French Société d'Encouragement pour l'Industrie Nationale (the Society of Arts of France) the results of his experiments in this connection, which have enabled him to constitute a whole series of enamels having various degrees of expansion. It appears that enamels containing cryolite, fluorspar, and a little rutile, or native titanic acid, possess very high degrees of dilatation, and that cast or wrought iron, coated with calcareous enamels containing no lead, which are not at all injurious, may be formed by using boric acid.

Wooden Joints in Cast-Iron Mains.—The Superintendent of the St. John's, New Brunswick, Water-Works (Mr. W. Murdoch) in the course of a recent report, referred to the use of wooden joints in a 24-inch cast-iron main laid during the past year. On a total length of 16,900 feet of pipe, very few lead joints were employed; only 3·8 tons having been used. Where it was necessary to fill the trench immediately, or the joint spaces were too open or too close for the wooden staves to fit, lead joints were made; but the rest were formed with clean dry pine staves, free from knots, gum, and shakes. They were driven home and thoroughly wedged and tested by filling the pipe with water before covering. The two oldest such mains in the city—laid in 1851 and 1857—jointed in this manner, have given such entire satisfaction that it was decided to use the same system in the new mains.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 383.)

BUSINESS during the broken period of last week that was available for work on the Stock Exchange was not more animated than could be expected; but still the week was not got through without some incidents of interest. Beginning fairly steady at the opening, markets gradually drifted into a rather sensitive condition, and finished decidedly flat. Conspicuous among them were Consols, which had another sharp fall, and on Thursday were marked as low as 105⅝. They were influenced in some degree by the Money Market, which was rather apprehensive of a rise in the Bank-rate. But when misgivings were seen to be unfounded, a rather better tendency set in. Business in the Gas Market was reduced to very mean proportions, nearly every issue being very quiet; but there were a fair number of changes effected in quotations considering how quiet things were. Movements were irregular; but the gains more than counterbalanced the losses. In Gaslight and Coke issues, the ordinary made a recovery—opening at 107 and rising to 109; but transactions were upon too limited a scale to indicate any very pronounced firmness. South Metropolitans were fairly brisk, and improved upon their advance of the preceding week, aided by the report and accounts for the half year, which show a satisfactory increase in the business. Indeed, generally all over the country the first half of 1899 has been a good time for Gas Companies. Commercials were quiet and unchanged. The Suburban and Provincial Companies gave no sign beyond that of general steadiness. The Continental Companies were but very little noticed; and Imperial had a slight relapse—falling back a couple of points. Among the rest, the only changes were in the Argentine quarter, where River Plate advanced and Monte Video receded. Business in Water was of the quietest. Southwark ordinary had a fall.

The daily operations were not heavy enough to call for detailed description; every day being quiet beyond the average. On Monday, South Metropolitan rose 1, and River Plate ¼. On Tuesday, Gaslight ordinary advanced 1; but Imperial fell 1, and Monte Video ¼. On Wednesday the changes were limited to a fall of 1 in Imperial; and on Thursday, Gaslight ordinary had another advance of 1. In Water, Southwark ordinary fell 3.

ELECTRIC LIGHTING MEMORANDA.

The Future of Electricity Supply in the City of London—An Unprofitable Business—The Poor Man's Light in Shoreditch.

THE future of the electric light in the City of London is still the most burning question of the hour, for followers of the industry. In the midst of the three-cornered controversy provided by the proceedings of the Charing Cross Company, the Directors of the City Company have issued their half-yearly report. The most important feature of this official statement is the declaration that, in view of the unknown effect which the reductions in the price for electricity will have upon the Company's revenue, the Directors have decided not to pay the customary interim dividend on account for the half year on the ordinary shares. This reservation is the most prudent thing the Board have done throughout the whole of the troublous times that have overtaken the undertaking. Meanwhile, the market quotation for the shares has dropped to 11-12, or not much more than one-third of their top price. The position now taken up by the Company is that while they have been victimized and injured, neither their new rivals nor the consumers of electricity in the City will be benefited. There is much reason in this contention; but, unfortunately, it is belated. If the City Company had talked to the Corporation and the Board of Trade three months ago in the same sense as they talk now, the whole course of events might have been different. As it was, they kept a stiff upper lip until their noses had been actually brought into contact with the grindstone. Hence these tears. The Directors of the City Company persist in blaming the Corporation for what they call their "breach of faith" in abandoning the Company to the tender mercies of the Board of Trade. This is idle recrimination. It is even worse—it is childish pettiness. From the moment when the Savory libel action failed, it was evident that the Corporation agreements with the City Company were worthless. How in the world could the Corporation continue to consider themselves bound by instruments which had been denounced in the Courts? The City Company ought to have been equal to the occasion, and have thrown up the agreements on the instant—leaving it to the Corporation, if so advised, to defend or ratify them. This was emphatically the line for the Company to take, especially as the benefit of the contracts was all on the side of the Corporation. At the outset it is conceivable that the agreements helped the Company to get their capital subscribed. If so, this advantage had been reaped; and those who put their money into the Company were rewarded by a good dividend. The only continuing obligation under the agreements was for the Company to supply the public lighting at a price which barely exceeds the cost. The contracts, although they mentioned the

subject, could not confer upon the Company the monopoly of private lighting; for the simple reason that the Commissioners of Sewers, who originally made the contracts, had no such privilege to give to anybody.

However, what is done cannot be helped. The City Company are face to face with a competing concern; and the latter are bound to do their best with their new privileges. The outlook for the one is not much brighter than for the other. The Directors of the City Company, having learnt in the hard but excellent school of experience that Parliament does not recognize their imagined special engagements, now propose to ask Parliament to relieve them of certain special obligations as to depreciation and reserve funds. Also, the Board will seriously consider the expediency of obtaining powers to extend their area of supply in various directions. This is quite legitimate. If the Company are to be treated as a common, ordinary electricity supply undertaking in one respect, fairness demands that the treatment should be made uniform. A "Pall Mall Gazette" reporter has had an interview with the heads of the concern, and has registered the views of the administration on the morrow of their defeat. Without saying anything more about their new policy of rate-cutting, the City people showed the reporter that their rivals are not likely to find much "fat" in the City lighting. It is as much as ever that the new comers will make a profit of ¼d. per unit. At this rate, they will need to supply 430,000 lights to clear 2 per cent. on the capital outlay of £800,000 to which they stand committed. Where are these lights to be had? After nine years, the City Company themselves had 430,000 lights on circuit. It is estimated that the lights served by gas number a million. "This is the reserve upon which the Electric Companies must draw." Obviously, "in time there may be some opening here;" but it may be doubted whether those users of light in the City who fancy electricity have not been mostly gathered in already. If so, the Charing Cross Company must look to their competitors' preserves for the best of their game. And if the old firm are willing to sell at a cutting price, their customers will have no inducement to change. Altogether, it looks as if the future of the electric lighting business in the City of London has been wrecked for the sake of the consumers, who will not benefit in the long run.

The moving history of the City of London electric lighting has occupied our space of late to the exclusion of other matter of the same order of interest. Just beyond the City lies the ancient precinct of Shoreditch, where electric lighting "in all its branches" is understood to be done to great advantage by the Vestry. A new departure in the administration of this undertaking has recently been signalized. It is nothing less than a spirited attempt to beat the coin gas-meter in its own domain, and render electricity in truth, what it has long been in the fancy of Sir W. H. Preece, "the poor man's light." Shoreditch has been engaged upon the housing problem, and has nearly completed a scheme for accommodating 400 people at a cost of £55,000. An illustrated account of the new buildings, which replace old "slums," appears in the "Municipal Journal" for the 21st ult. The building contract works out to 7¾d. per foot cube, or £41 10s. per person provided for. The rents are to be 8s. 6d. per week for the 3-room sets, and 6s. 6d. for the 2-room sets, which will pay over 3 per cent. on the outlay. Now comes the novelty: Those tenants who desire it, will be able to have electric light upon payment of an additional 8d. per week for the 2-room sets, and 10d. for three rooms. The wires are laid to the landings, and all the Vestry will need to do is to run the connection into the rooms. This is all right. If the costermongers and others for whom the tenements are intended care to go to the moderate extra expense indicated for the luxury of electric light, it is their affair. How the lighting is to pay at the price is the affair of the parish. So enthusiastic does the Vestry appear to be in the cause of popularizing the electric light, that a strong feeling has arisen in favour of installing it throughout the buildings, for use by the tenants free of charge. This proposal is a little too Progressive for the majority of the Vestry; the Clerk having reported that it would entail a small loss on the whole scheme. Of course, the plea is that the electric lighting being in the hands of the parish, every facility should be given to the inhabitants for its use. But if it is to be given away to the dwellers in model lodgings, where is this generosity (at other people's expense) to stop? Shoreditch seems already to be coming within measurable distance of the Island of Barataria, first discovered by Gilbert and Sullivan. Incidentally, it might here be asked what facilities are offered to the introduction of gas into these Shoreditch tenements. If the Vestry had happened to own the gas supply, as well as the electric light works, the world would probably have been invited to observe the liberality with which they gave their tenants the option of taking to either convenience, or to both. As it is, electricity gets an easy first, gas being nowhere. This is Municipalism in practice; and it is hardly to be wondered at if the heavily-rated Gas Company were to hold the opinion that this sort of Progress is preferable in theory to the realization.

THE Select Committee on Police and Sanitary Regulations Bills have just issued a report on their work in the present session. It concludes with the reiteration of the suggestion previously offered—whether the time has not arrived for the inclusion in a Public Bill of many of the clauses so frequently introduced into Private Bills, and accepted by Parliament.

PUBLIC OPINION ON THE LONDON GAS SUPPLY.

A WEEK has elapsed from the publication of the report of the Metropolitan Gas Companies (Powers of Charges) Committee to the moment of writing; and not one of the London daily newspapers of the first class has deemed the matter of sufficient importance to form the subject of a leading article. This bare statement of fact is sufficient to indicate how completely London differs from every other British city as regards the degree of interest taken by the people in questions of local government and administration. Whatever the merits of the Committee's report, it seems almost incredible that a public document of such weight—bearing upon a subject that touches the pockets of the majority of the householders of the Metropolis—should be allowed to remain unnoticed by the newspapers whose province it is to register what passes for public opinion in London. The circumstance does not augur well for the effective realization of the objects of the new Government of London Act. On the other hand, perhaps it might be argued that if the new London Municipalities were actually in existence, they would do something to put in its proper place, as a metropolitan question, the topic of the price at which London ought to be supplied with gas. So far the "Daily Chronicle" and the "Financial News" are the only London daily papers that have dealt prominently with the Committee's report. At any rate, their articles are the only exercises of the kind that have as yet come under our notice; but, of course, others may follow. Nobody has even written a letter to "The Times" on the subject.

The special article of the "Daily Chronicle" fastens first upon the proposal to hand over the southern district of the Gaslight and Coke Company to the South Metropolitan Company, which it approves for the reasons that commended themselves to the Committee. The judgment of the Committee in regard to the excessive expenditure of capital, and the mismanagement of the business of the Gaslight and Coke Company, is accepted. The only comment offered is that "perhaps it is not too much to expect that, in the circumstances, the Directors will take immediate steps to reduce the charges to consumers North of the Thames, even though a portion of the shareholders' dividends have to be sacrificed." The "Financial News" characterizes the proposals of the Committee as "drastic," but thinks the result of the inquiry was to have been expected, as it had "pointed out that the Company had need to find better explanations and answers than its officials had then vouchsafed if it were to escape condemnation." The reference to the loss of the Company's Bill in the Directors report—which declares that the measure was drafted with "the fullest consideration for the interests of the consumers of gas"—is condemned as coming "far too late to save the Gaslight and Coke Company from deserved obloquy." The writer of the article, however, fell into the error that the proposed revision of the sliding-scale in the cases of the London Gas Companies would only affect new capital issues. This is not so—the report making no such limitation. The general conclusion of the article is that "the Committee's recommendations are eminently fair, and are sure to be popular, even though the remedies they embody must act gradually." It is also hoped that the report will not be shelved, but "will be acted on at the earliest possible moment by the Government, which must undertake all legislation referring to the sliding-scale." This is not quite correct; the truth being that action in this regard can be taken by the Committees to whom Gas Bills will be referred in the ordinary way. An "Instruction" by the House to the Select Committee would settle this business.

The *agenda* paper of the London County Council is now of the bulk of an extra good number of the "JOURNAL." The paper for last Tuesday's Council meeting—the last before the recess—contained a statement relating to the report, by the Parliamentary Committee, to the effect that the case prepared for the Council by the Comptroller (Mr. Haward) and Mr. Charles Hunt, had prevailed with the Select Committee. The various recommendations of the Committee are explained, and some of them referred to their sources; but fuller consideration of the report is deferred until after the recess. It is declared that the recommendations of the Committee "endorse" the action of the Lords' Committee in rejecting, at the instance of the Council, the Gaslight and Coke Company's Bill of the present session. The choice of the word quoted seems to have been hastily made. What was intended to be said is, evidently, that the report of the Select Committee justifies the action of the Lords' Committee, which is a bigger thing than endorsement. We shall hear more about this when the Council Committees get to work again after the holidays.

References to the report of the Select Committee have appeared in the "Municipal Journal" and in the "Builder." The former periodical claims to be the organ of Progressivism in municipal affairs; but, like many other would-be technical journals of the time, it has no special knowledge of the matters which it affects to treat expertly. It refers to the Gaslight and Coke Company as "that grasping monopolist," and apparently mistakes the report of the Committee for an Act of Parliament, inasmuch as it states that "the Gaslight and Coke Company is condemned for the inefficiency of its management, and compelled to reduce its charges." The article ends with the brilliant suggestion that "another reform yet required is better means of testing the

illuminating power of the gas. The statutory candle power in London is lower than in most towns, and the means of testing it less efficient." This is rank journalistic "Progressivism" indeed—that is to say, it is bumptiousness based on ignorance.

The reference to London gas affairs in the "Builder" is of a superior cast. This journal has kept an intelligent watch over the subject of late; and we have recognized the ability and knowledge of the matter shown by its gas notes. In a recent issue (July 29), there is a thoughtful article in which certain features of the gas supply of London are singled out as especially worthy of notice at the present time. The report of the Select Committee only comes in for passing notice, probably for want of time; the greater part of the article being occupied with other matter. The position of the Metropolitan gas industry, as viewed by this observer, is set out under seven distinct heads, as follows: 1. In spite of the increased use of electric lighting, the output of gas has increased and still increases, so that it "has reached a volume almost inconceivable in its magnitude." 2. Although 50 per cent. of this gas is employed for heating purposes—more, if its use in incandescent lighting is regarded as coming under this head—no calorific standard has been fixed for it by Parliament, and no calorific test is made by the London Gas Examiners. 3. The Gas Referees, without the special consent of Parliament, have not merely altered the method of testing for illuminating power but have also introduced a new standard of light. The writer's other points are, the proposal of the London County Council to legalize the portable photometer; the discrepancy in the current prices of gas in different parts of London; the cost of incandescent mantles; the insufficiency of the minimum standard of pressure in the distributing system.

It is remarked that, when Parliament regulated the powers of the Metropolitan Gas Companies, gas was used almost wholly for lighting. The question of its calorific value was, therefore, not considered. It is argued that the large consumption of gas for heating purposes has placed this question in the foreground. Fortunately, the requirement of supplying gas of 16-candle power has hitherto operated practically to keep the fuel value up to a fairly uniform figure. It is said, however that now, "as the proportion of water gas in the supply increases, the heating value of the mixture decreases; for a 16-candle carburetted water-gas flame has a somewhat lower calorific value than a 16-candle coal-gas flame, and it is not impossible that at some future period a cheap method of enriching a gas of low-heating value to the 16-candle standard, without at the same time increasing its heating value to approximately that of coal-gas of the same illuminating power, may be devised." Consequently, the suggestion is offered that Parliament should be approached with a view to the fixing of a minimum calorific value for London gas. Actually, the writer hints that the Londoner only gets 14 or 14½ candle gas, while paying for 16-candle gas, because the former quality is the permanent product of the Durham coal which is carbonized at the London gas-works—the additional enrichment being so much "doctoring" for the benefit of the testing stations. The extra illuminating power imparted to the gas by the addition of petroleum spirit, or carburetted water gas, does not usually reach the consumer, as is shown by the results of testing with the portable photometer.

The writer is fair enough to admit that the proposal to make the Gas Companies responsible for the condition of the gas at the outlet of the consumers' fittings is about as reasonable as it would be to require a Water Company to bear the responsibility for the state of the water found in any householder's dirty cistern. "The portable photometer, if found to be a reliable testing apparatus, can only be fairly used in buildings which have been fitted in a manner approved by the gas supplier, and in which suitable means are provided for maintaining the services in a clean condition"—and where there is no meter. This is all very well; but if the writer knows so much, he must also be aware that the whole system of statutory gas photometry, as practiced by the London Gas Examiners under the direction of the Referees, is the most exacting and thoroughgoing of its kind in the world. Under a municipalized administration, short work would be made of the greater part of it; and the portable photometer would be ignominiously consigned to a Spring Gardens lumber-room. Ask the Birmingham or the Manchester Corporation what *they* think of gas photometry! The only rational rule in the matter is that for which Mr. Livesey has long contended with regard to London, and which is practiced by all the great gas-supplying municipalities. A good natural coal supply is selected; and the consumers have to take the gas that results from its carbonization, without being taxed for artificial enrichment. The supply of carburetted water gas complicates the business somewhat, as this product can be made of any quality desired within wide limits; but no practical hindrance exists to prevent it being made to a standard.

London common coal gas might conceivably be enriched by some material which, while heightening its nominal illuminating power, did not enhance its calorific value. But inasmuch as it is inconceivable that any treatment of the kind should have the effect of depreciating the fuel value of the gas, the necessity for a calorific test cannot be accepted as proved. Carburetted water gas is reported to be of slightly lower calorific power than coal gas of the same illuminating power; but the comparison has not been worked out for all ordinary limits of candle value. Besides, carburetted water gas is never sent out without a preponderating addition of coal gas; and it is doubtful whether any difference of fuel value could be detected in these circumstances except by the most delicate calorimeters. Neither consumers' kettles nor Welsbach burners reveal it. The conclusion of the whole matter is, that if the standard nominal illuminating power of London gas were fixed at 13 candles, tested anywhere by the portable photometer under reasonable guarantees for fair-play, the consumers would get exactly the same value for fuel and light as they get now—saving about 3d. per 1000 cubic feet in price, and sparing an enormous amount of trouble and anxiety. London could save itself half-a-million of money a year in this way—which might help the County Council to a Palace!

With regard to the power of the London Gas Referees to override the express words of Parliament prescribing the standard of light, we are not inclined to offer an opinion. It is a strong line to take, doubtless; but the change is admittedly for the better. As to the dearness of Welsbach mantles and burners in England, of which the writer in the "Builder" complains, that is a matter which has nothing to do with the Gas Companies. It may be true, as stated, that incandescent mantles can be purchased in some European countries for 3d. apiece; but presumably this is where there are no patent rights. When these expire in England, "we shall see what we shall see;" but one of the results we anticipate is an accession of strength to the demand for cheap and pure gas, in preference to gas of a nominal illuminating power as the term was understood before the introduction of the incandescent gaslight. Upon the incidental advantages of such a gas supply—rendering gas-fires and gas kitcheners universal—it is unnecessary to descant here.

WORKMEN'S THRIFT.

In discussing recently the report of the Committee on Shop Clubs and the subject of Workmen's Benefit Societies generally, we found ourselves at variance on one or two points with opinions expressed severally by the Chief Registrar of Friendly Societies and by the Hon. Sydney Holland.

Our difference from Mr. Brabrook was on the question of Slate Clubs, to which he, while pointing out some of their obvious disadvantages, was inclined to extend the encouragement of the law, on the ground that, because popular, they must *ipso facto* be necessary and desirable. We expressed the opinion that the disadvantages enumerated by him were, in themselves, sufficient to render membership of such clubs inadvisable. The fundamental objection that we urged against this form of so-called "thrift" was that, while being frequently the means of inducing men to neglect more reliable forms of providence, they themselves almost invariably fail a man when he has most need of the benefits of providence—namely, when he, having become advanced in years, finds his health failing and himself unable to join any other Society.

This view of Slate Clubs is, we are pleased to observe, supported by the evidence of a writer on the subject, in the current number of the "Economic Journal," whose opinions are based upon investigation and inquiry among the members of such Clubs. The writer, moreover, points out further particulars in which these Clubs contrast unfavourably with the permanent Friendly Societies; one of the most important being that, in the case of the former, the expenses of collection and management are as a rule enormously greater in proportion to the benefits obtained—great wastefulness and slovenly business habits often characterizing the direction of their affairs. The quotation of one rule of such a Club lends support to the opinion that their business is not infrequently conducted by men of no education or experience (the italics are our own):—

"That two members *who can read and write* be chosen by a majority of the members on quarterly nights to audit the accounts"

We do not suggest that a Club that found it necessary to frame such a rule is to be taken as fairly representing the average Slate Club; but it is undoubtedly the fact that a Club solely managed in the workshop by men who cannot, in the nature of things, be possessed of the business and financial knowledge necessary to the economical and rational management of a Provident Society, is at a considerable disadvantage over a Friendly Society in the hands of expert managers, and is more expensive to the members, as well as being less reliable in regard to stability.

A further objection is to be found in the fact that so many Slate Clubs, although nominally instituted for the encouragement of thrift, are, by their association with the public-house, actually the means of fostering habits of intemperance and improvidence; being really instituted for the benefit of the publican instead of his customer. "In the public-house Clubs, the landlord of the inn at which the Club meets is frequently the treasurer of the funds. The Club meeting is usually once a week, and appears generally to extend over almost the whole evening, though sometimes some limited time—*e.g.*, two hours—is specified in the rules." It needs little argument to demonstrate the value of the habits of "thrift" so engendered. The writer quotes the opinion of a foreman, that the reason why hardly any of the employees were members of either of the independent Friendly Societies, was to be found in the attractions of the numerous Slate Clubs, and the social inducements to join them. "A man likes to have a Club for every night of

the week." He considered that many of them were exceedingly unsound. Another source of wastefulness is, of course, this multiplied membership of Slate Clubs. "The officers of all these Clubs are remunerated for their services. The Clubs all meet weekly. The club-room must be paid for either in money or by bringing custom to the landlord."

This brings us to one of the questions which, as we have remarked, recently arose between Mr. Holland and ourselves. Discussing the rules of the Friendly Society connected with the docks of which Mr. Holland is Chairman, we spoke of workingmen being desirous of making provision, by the agency of outside Friendly Societies, for maintaining their incomes at a figure which would keep them and their families from want should they be temporarily disabled from work. Thereupon Mr. Holland somewhat dogmatically remarked: "No men now insure themselves in Friendly Societies for their whole wage. If you will inquire, you will find that this is so. I meet lots of them in my hospital work; and the sick insurance is never more than half the full pay." We had the temerity to be equally dogmatic, and replied that out of our own experience we knew Mr. Holland to be wrong, and that we had, therefore, no need to inquire. We are now, however, in the position to support our dogmatism by the facts set out in the article to which we have referred—facts that have been discovered by the inquiry for which Mr. Holland asked. These then are some of the instances given—

A foreman (of unskilled workmen) in the employment of a large Company in South London, earning 45s. a week, belongs to the firm's Benefit Society, which is obligatory, and to which the subscription is 9½d. per week. In addition, he belongs to four Slate Clubs, all connected with public-houses. The weekly subscriptions to these clubs are respectively 8d., 6d., 7d., and 7d., exclusive of entrance fee (1s. or 1s. 6d.), from 1d. to 3d. for copies of rules, levies on the death of a fellow member or of his wife, and additional subscription for medical attendance. . . .

An ordinary workman in the same firm, whose wages vary slightly from week to week, but are stated by his foreman to be never more than 35s. a week, belongs to two Slate Clubs in addition to the firm's Club. . . .

The cases quoted appear to be typical, and not at all exceptional cases among the employees of this firm. . . .

A compositor, wages 55s. per week, belongs, and states that many of his fellows, even though their wages may not average more than £2 per week, belong, to Societies insuring in the aggregate 47s. per week at the beginning of an illness, £57 at death, 12s. per week if out of work, 25s. per week if on strike, a possible 20s. per week and apartments in Almshouses in old age, and Convalescent Home benefits when needed.

This compositor, says Miss Deverell (the writer of the article), believes that few insure themselves up to the full amount of their wages. But opinions on this question differ somewhat. Another trustworthy informant shows that of the men in his shop (compositors, in this instance, also) *half* receive more when away through illness than when at work. But this appears to be unusual.

We think we have quoted enough to show that Mr. Holland was in error in judging of the whole of the industrial world from that part of which he has particular knowledge. But our object in reverting to this subject is not merely, nor mainly, to establish the truth of our contentions. We wish particularly to again call the attention of employers to the existence and multiplication of these Slate Clubs, their very unsatisfactory character, and the mischievous influence they exert upon the men. Miss Deverell, at the commencement of her article, states that she has excluded from consideration all Slate Clubs in which the firm takes any share in the management, and remarks that, in the case of clubs confined to the employees, "the employer frequently does not know of their existence. Such clubs, therefore, are in some respects inferior in interest and importance to the Shop Club, since they have no bearing upon the employment contract, and have no effect whatever on the relations of employer and employee. They have, however, an importance of their own." As to their unsatisfactory character, it cannot be doubted that a man who attends a club meeting at a public-house every night in the week must occasionally, if not generally, be far from fresh and vigorous in the morning. The extravagance and instability of such clubs have been pointed out.

But how, it may be asked, can an employer prevent his men from making fools of themselves outside the works—and thereby decreasing their industrial value inside—without interfering with their individual freedom? By no direct means can he do so, nor would it be politic if it were possible. But indirectly he may do something to keep his men away from clubs whose influence upon both the finances and morals of the members is bad. This may be proved by a consideration of some of the *raisons d'être* of such clubs. It is, as Mr. Brabrook has pointed out, obvious, from their great and increasing number, that Slate Clubs have considerable attractions for very many people. From that fact Mr. Brabrook argues in favour of their encouragement. We would rather aim at their supersession. Slate Clubs are, we take it, formed most frequently for some or all of the following purposes: (1) In order to provide more numerous varieties of benefits than those ensured by membership of ordinary Benefit or Friendly Socities; (2) to augment the amount of such benefits as are ensured by such Societies; and (3), to provide the excuse for frequent friendly and convivial meetings.

What, then, we think employers may well do to provide inducements for their men to leave Slate Clubs alone, is to so widen the scope of the Shop Club as to enable the men to find in its membership all the legitimate advantages, without the accompanying disadvantages, of their Slate Clubs. The employer in most cases, we fear, contents himself with starting, and subscribing annually to, a Benefit Society for his men, which, for a small subscription, ensures a fixed weekly allowance to the members in the event of disablement through sickness, which allowance, in the case of the better-paid men, rarely exceeds a third, sometimes not a quarter, of their wages. This, apparently, the employer thinks will suffice to support a man and his family during, and provide for the special expenses entailed by, an illness of some weeks! The men, who know better, see the necessity of making further provision against sickness and form Slate Clubs of their own, or join one at a public-house. Then, when convalescent, the men have to depend either upon charity or else upon a Slate Club for the benefits of a rest at the seaside or in the country. Again, if the men want—as what men do not want?—an annual outing, that has to be saved up for by means of a Slate Club among themselves. Would it not be practicable and advisable to make the Shop Club more elastic in its provisions? For example, let the weekly subscription and the benefits thereby ensured vary from a low figure up to a high one; so that the high-waged foreman and the low-waged beginner, the much and the little provident, may each and all find in the Shop Club a cheap and reliable means of ensuring those advantages which they wish to secure, and which, if not provided by the well managed Shop Club, the men will subscribe to the extravagant and unreliable Slate Clubs to obtain. Allow any man, on proper terms, to be transferred from one class of subscribers to another, as his wishes or circumstances change. For instance, he might reasonably desire to effect more substantial insurance after marriage than when single—in fact it is difficult to persuade many single men to insure at all. Let it be understood that if the men wish to save up for their summer outing, the Club will collect and keep at interest their subscriptions. In fact, make the Shop Club *the* thrift institution of the works; and then, if it be possible to associate it with a social club and reading room for the men, conducted on reasonable and commonsense lines, where they can hold their Shop Club meetings, smoke, have their sing-songs, and, we should not hesitate to say, be allowed to have their drinks, much may be done to quietly encourage genuine, and replace injudicious and miscalled, thrift among all classes of the men, create and maintain amicable relations between them and their employers, and so advance the interests of both.

PERSONAL.

Mr. H. J. Robus has been asked by the Urban District Council of Wells-next-Sea to inspect and report upon their gas-works.

Mr. Isaac H. Golightly, who holds the position of foreman at the Hexham Gas-Works, has been appointed Manager of the West Stanley Gas-Works.

The Leicester Town Council last Tuesday advanced the salary of the Town Clerk, Mr. J. Bell, from £1250 to £1500, in recognition of his valuable services in connection with the Derwent water scheme.

Referring to the list of prize winners at the last examinations in "Gas Manufacture," given in the "Journal" a fortnight ago, we learn that Mr. R. Nelson, who gained the silver medal in the Ordinary Grade, is a pupil of Mr. Herbert Lees, Assoc.M.Inst.C.E., the Engineer and Secretary of the Hexham Gas Company.

The Malvern District Council having taken over the Malvern Link Gas-Works, have decided to compensate the two chief officials for loss of office. To the Secretary, Mr. J. H. Lyon, they are proposing to pay £7 10s. per annum; while the services of the Manager, Mr. John Gould, are to be retained for two years from Jan. 1 last, and afterwards he is to receive a pension of £1 per week.

Mr. W. J. Jeeves, who at the beginning of last week severed his connection with St. Helens as its Town Clerk in order to enter upon his duties in the same capacity at Leeds, was on Monday presented by the Mayor of the former town with an illuminated address. It bears testimony to the great services of Mr. Jeeves to the borough, and to the regret with which his resignation had been accepted. His connection with the Corporation dates from 1888, when he was appointed Deputy Town Clerk; his elevation to the higher office occurring three years later.

OBITUARY.

The death is announced of Mr. E. Farr, of Stockport, one of the Directors of the Stockport Water Company, whose undertaking is being transferred to the Corporation. He was in his 79th year.

Last Friday week, Mr. William Jones, who was formerly Secretary to the Darlington Gas and Water Company, died at Windermere. He relinquished the appointment mentioned at the time the concern passed into the possession of the Municipality.

As mentioned by Mr. Livesey at the meeting of the Crystal Palace District Gas Company last Friday, the members of the Board have lost one of their colleagues by the death, on the previous day, of Mr. Alfred T. Layton; the sad event taking place suddenly at his residence at Croydon. In addition to his connection with the above-named Company, Mr. Layton was a shareholder in the Croydon Gas Company, and was a frequent attendant at the meetings. He took a very prominent part in

municipal affairs, and was a most respected member of the Corporation of London; having been elected a Common Councilman in 1886. Last year he was chosen for the position of the Chairman of the General Purposes Committee. He was upon the old Local Board for Croydon; and when the town was incorporated in 1883 he was elected member for South Norwood. He was immediately made an Alderman—a position he held until his death; and was Mayor in 1886. Deceased was about 73 years of age.

NOTES.

Tar Macadam.

It is reported that tar macadam for road making is steadily growing in favour with highway surveyors. At the last exhibition of road-making materials arranged by the "Surveyor" at the Agricultural Hall, Islington, specimens of macadam made with tar were shown by the Buxton Limestone Firms Company, and others. The Buxton exhibit is thus described in the catalogue—an excellent record of actual practice in this art: "This material makes an excellent foundation when laid as follows: On a concrete foundation or a gravel or roughly-broken stone well rolled, a layer of 2½-inch bottoms 3 inches thick and thoroughly rolled. On this a layer of ¾-inch tops 1 inch thick and thoroughly rolled. Sprinkle over surface some ¼-inch limestone grit. Wears evenly, is non-slippery, requires no watering, and very little scavenging; and costs little to keep in repair." Kent rag and tar macadam was shown by Messrs. Chittenden and Simmons, of West Malling, and by Mr. E. J. Elford, Engineer and Surveyor to the Portland Urban District Council. A footpath in this material at a gradient of 1 in 8 was not slippery. The manufacture has been taken up in America. Mr. G. G. Barrow, of Hamilton, Ontario, lays 2-inch tarred stone, 4 inches thick, on the hard core. Over this he puts a ¾-inch layer of fine chippings, well rolled. The stone to be tarred is heated on an iron floor, over flues, until it is thoroughly dried. It is then mixed with boiled tar, to which a little pitch has been added, in the proportion of 8 gallons per cubic yard of the 2-inch, and 10 or 12 gallons per cubic yard of the fine stuff. A dressing of screenings finishes the road surface.

Oil for Laying Dust.

A short time since, we mentioned in this column the use of heavy oil for keeping down the dust of railway tracks. As might have been expected, the same experiment has been tried upon a common road, it is reported, with much success. Many endeavours have been made to economize and render more lasting the liquid used for road sprinkling; but hitherto nothing but fresh water, lightly and frequently applied, has proved satisfactory. Doubtless inspired by the news of the railway track experiment with oil, Mr. A. E. Davis, the Chairman of a Californian County Board, has applied the same treatment to several miles of roads in this sunny locality. Only, having regard to the circumstances of a common highway, as distinguished from those of a railway track, Mr. Davis's method of distributing the oil is peculiar. He does not sprinkle it like water, to which operation there would be many objections. Attached to the road oil-tank is a separate machine, designed somewhat upon the principle of a seed-drill. Only a sufficient quantity of oil is discharged, through tubes spaced 6 inches apart, to take up the dust. Before the end of the oil-pipe, a little hoe scratches a furrow in the dust to receive the oil, and this is immediately covered with dust by other hoes following after. This is to prevent the oil from seeking a level in any low place in the road, and becoming unevenly distributed. The description of the machine ends with the somewhat enigmatical sentence: "After all the oil has been applied, the same machine is used to incorporate the oil and the earth." One would have thought that this was done as the oil ran into the dust-furrows. It is said the oil binds with the dust into a sort of asphalte.

Electrolysis of Water-Pipes.

Some tests have recently been made at Yonkers to determine whether electrolysis caused by straying street railway currents is likely to damage the water-pipes of the city. A preliminary investigation has been made by Mr. A. A. Knudson, of New York City, and the following information has been taken by the "Engineering Record" from his report, lately submitted to the Water Board of Yonkers. The tests were made on the 16th of May, using a Weston two-scale voltmeter arranged for high or low readings, which had recently been standardized at the Weston factory in New Jersey. Twenty-one tests were made in various parts of the city, covering all the lines of electric railway in operation. Of these tests, fourteen showed reading above 1 volt, five above 3 volts, and one as high as 17 volts. Near the point where the last reading was taken, a piece of lead service-pipe had been removed from the street on account of failure, the cause of which had not before been recognized. Mr. Knudson states that a sample of this pipe shows unmistakable signs of the action of electrolysis; and, since the tests were made showing the heavy escape at this point, he considers it an excellent illustration of cause and effect. As a result of this preliminary investigation, it is believed that there are at least eight different locations in Yonkers where the voltmeter tests indicate a condition dangerous to water-pipes from electrolysis. The excessive flow of electricity into the pipes is regarded as very serious, being liable to cause disintegration of the lead packing between the joints. In another city there was a case of this kind, where two joints had been so eaten away as to cause bad leaks which were expensive to repair. This case showed a difference of potential of 5 to 15 volts, the rails being positive, and a water pressure in the pipes of about 40 lbs. per square inch. The conditions at Yonkers are similar, except that the water pressure and voltage are both higher; the former being 133 lbs. per square inch. Another reason given for apprehension of damage is that as the current goes into the pipes, it must come out at other places in seeking its return to the station; and at such places electrolysis has heretofore been found destructive. As far as the tests at Yonkers have been carried, two places have been found where the pipes are positive, with readings above 2 volts at both places. It has been held by some engineers that a difference of potential higher than one volt should not be allowed between the rails of a trolley road and water-pipes, particularly if the pipes test positive to the rails In view of the high pressure at Yonkers, Mr. Knudson believes it will prove unsafe to allow a greater difference of potential than half a volt maximum.

COMMUNICATED ARTICLE.

THE CONSUMPTION OF WATER PER HEAD IN DIFFERENT TOWNS.

By A Distributing Engineer.

Many readers of the "Journal" will doubtless be grateful for the report of the valuable paper on the above subject read by Mr. James Watson at the last conference of the Institution of Civil Engineers, and given in the number for the 20th of June. In these days of County Councils, Urban District Councils, &c., one has to refer to such expert evidence in order to rebut the extraordinary statements of the members of these bodies; and therefore Mr. Watson has done great service in bringing forward the valuable facts and arguments he laid before the Institution. The words "rate per head per day" have no meaning—the idea is wholly illusory—when comparing the statistics of one town with another. The circumstances and conditions of each town must be fully ascertained; otherwise any statement made must be very inaccurate and misleading. If the British Association of Water-Works Engineers would formulate and issue to their members a form of returns, so that similar abstracts could be made as to the practices of the various towns, much valuable information would be disseminated and assistance afforded.

Many a new councillor thinks himself an authority on intricate questions of water supply. A councillor in a neighbouring town probably tells him that they only use 20 gallons per head per day for all purposes; but he does not explain that there are no hose or gardens in his town, that only half of the houses have water-closets, and that there are no baths or hot-water fittings. Conclusions based on such erroneous, hap-hazard statements, and manipulated by councillors who have not been educated in water supply, can never lead to correct or useful results. It is well to compare such places with a modern seaside resort, where three-fourths of the houses have gardens for which the hose is used freely, where every house has one, and probably two closets and a bath (sometimes two), and where the town councillors in their wisdom advise a three-gallon instead of a two-gallon flush, without any knowledge of the requirements, or any idea as to what an enormous output of water this unnecessary extra gallon amounts to.

A number of sanitary officials are now employed who advise all kinds of new apparatus, well adapted for the use—or rather misuse—of water; and they even insist on the employment of that monstrosity the "automatic flusher," which in most cases is supplied direct from the main. This is, if possible, a more serious danger than supplying the closet direct from the main, and doing away with cisterns. The great scarcity of water at the East-end of London last year furnished a sufficient object-lesson against the entire abolition of cisterns; as did also the frightful epidemic that occurred in at least one town through allowing the closet to be supplied directly from the main. New houses are being built in large numbers with baths and hot and cold water fittings—even in those rented at £35 per annum. This use of modern appliances cannot be adopted in those towns where so much talk is indulged in about the waste-meter system and its success. It is not sufficient to state that a certain town is or is not one which has adopted the water-carriage system, for many of these towns, after having adopted it for fifteen years, are still possessed of a large number of cesspools.

In different towns the consumption of water per head often varies to the extent of three times the average. This can always be accounted for. It is measured by the wants of the people, the facilities afforded for using the water, and the different habits of the population. Comparisons cannot be made even with towns of similar size and number of inhabitants; inasmuch as the rules and regulations are entirely different. One town

will adopt a waste-meter system, and as the result make some reduction in the output. But in all probability no systematic attempt had been made previously to stop the waste; and then an erroneous comparison is made. Other towns will washer the ratepayers' taps gratis; others will repair all taps for the ratepayers at 1s. per annum—the inspector going from house to house like a postman; and others will specify that all the fittings are to be of the highest class of manufacture, and will test and stamp all fittings and enforce rigid regulations. Take, for insince, a town using 35 gallons per head per day, which is sometimes compared with one employing the waste-meter system, and quoted as only using 10½ gallons per head per day. When the meter supplies are paid for, amounting to 20 gallons per head per day, and are deducted, and when the number of hose paid for, as well as the above-mentioned fountains, horse-troughs, &c., are considered, the waste-meter system, with all its supposed merits, does not seem to be in the position claimed for it.

These low quotations would not even meet the requirements of the trade wants of many modern progressive towns. The meter supplies must be deducted, as these are not comparable one town with another. Take the town of Richmond, which has a supply of 27 gallons per head per day for nine months in the year, while during the summer months 42 gallons are absolutely necessary; this being a town having a number of gardens on which hose is used. Torquay may be quoted as a town having a number of large hose-using gardens. There the average consumption of water for the year is 28 gallons per head per day; but for the summer months it is about 36 gallons. Plymouth will use 42 gallons per head per day. But out of this they have a trade supply of 17½ gallons; so that the domestic consumption is 24 gallons per head per day. With these fairly representative instances before us, I contend that a standard rate per head per day is not attainable; and when we are confronted with statements that 10 gallons suffice for all purposes in some particular town, the habits, wants, and demands of that town, and also the death-rate, should be fully stated.

Gardens are now universally watered by hose, revolving sprinklers, fountains, and other appliances for ornamental purposes; greenhouses are also most popular. Therefore, when this is the case, the supply becomes one for trade purposes, and should be served by meter. It is a mistake to omit altogether the charge for small gardens; they should be charged for by their area. But if a hose is used, then the minimum charge should be made—say, 21s. per annum. Some people are so shamefully unscrupulous that they fix the sprinkler or hose behind a tree or wall, and leave the water running all night. Closet taps and taps over sinks are left open all night, and these are never discovered unless the night inspector comes upon them in his rounds. Such scandalous, fraudulent misuse of water should be punished by a heavy fine. The regulations should clearly set forth that the hose is not to be left unattended.

The difference in the consumption of water per day per head of the population where efficient and inefficient regulations are carried out and enforced by law, ranges from 20 gallons in the former to 80 gallons and upwards in the latter case. Therefore it is of the first importance that adequate rules and regulations should be enforced, and proper measuring apparatus—such as the Venturi meter—fixed on all outlet mains at the source of supply. There is now no doubt that this meter is an absolute measurer, and is equally efficient whether placed on the pumping or the gravitation main. By it a daily diagram is produced showing the output every hour by day and night. The consumption per head per day can only be ascertained approximately by the pumping records; and the meter is of no assistance in determining the amount of waste or in preventing it. In the ordinary statements published as to the quantity of water pumped, no information is given as to the allowance made for the slip of the pumps, or for the water wasted and used at the works. It is obviously unfair to the distribution department of a water-works to state that a certain quantity of water has been pumped, when we know that from 7 to 10 per cent. should be deducted from the total given in the pump records. I have known some high-class pumping-engines, in works which are fairly well attended to, record a loss of 10 per cent. on the pumps, leakage, and usage on the works, or a difference of 10 per cent. between the quantity of water said to be pumped and that received in the reservoir. With the Venturi diagram to start with, the distributing or administrative engineer should be able to ascertain with the utmost exactness the amount of water that is being distributed. Then, as the only causes of an increase in consumption are waste and the number of new services and meter supplies put on, the quantity consumed per head may be accurately arrived at.

In considering the rate per head per day, the principal factor in the calculation is the actual number of people supplied. How should this be computed? Clearly, it should be estimated on one and the same basis for all towns. We know the number of houses supplied; but it is mere guesswork to try to ascertain the number of persons occupying the houses. If it is a fashionable seaside resort, the houses are all new, and built expressly for lodging-houses. The number of occupants is often stated to be six to a house. But in some districts I have found, as the result of actual counting, that it is nine; and inasmuch as the population is doubled for two months in the year, I find, from long experience, that, taking the year round, eight persons to a house is the nearest approximation that can be made.

TECHNICAL RECORD.

GAS PURIFICATION, WITH RECOVERY OF BYE-PRODUCTS.

The Discussion on Dr. Bueb's Paper.

A full report of the discussion on Dr. Bueb's paper on the above subject was not to hand when our translation of the paper, and comments thereon, went to press last week (*ante*, pp. 293 and 308). It will be seen from the following *précis* of the discussion which followed the reading of the paper that some of the points referred to in our comments were also dealt with by some of the speakers, and by Dr. Bueb in his reply.

The President (Herr W. von Oechelhaeuser) said that the gas industry was much indebted to Dr. Bueb for an important advance in the recovery of cyanogen, and that his process would be welcomed because it neither presented great changes in the working routine nor did it introduce novel apparatus on the gas-works. Cyanogen recovery in German gas-works would gain therefrom a considerable advantage over cyanogen recovery in English works. Should the process for the removal of naphthalene prove equally satisfactory when tried on the large scale on which trials were about to be made at Dessau, then Dr. Bueb's labours would have finally solved the naphthalene question, which would be an achievement that would interest many gas engineers even more than the advances in the recovery of cyanogen.

Herr Sartorius, of Aschersleben, remarked that xylene or solvent naphtha had recently been recommended for the purpose of removing naphthalene, and he had tried it on one occasion and found it answer well. He was not, however, able to examine his mains, and was anxious to learn if the cure was a complete and permanent one.

Dr. Bueb replied that Professor Bunte's work had demonstrated that xylene was the best solvent for naphthalene deposits in mains; but as benzol was in fact equally good as a solvent, it was a question of the relative prices of the two materials which should be used. He referred to the apparatus for the removal of local deposits of naphthalene which was recently described in the "JOURNAL" (*ante*, p. 171). Naphthalene when once dissolved by benzol or solvent naphtha was harmless, as its volume was so greatly reduced by the process of solution.

Dr. Bunte, of Carlsruhe, said with reference to the removal of naphthalene that solvent naphtha was preferable to benzol, even though it cost more, because its vapour tension was lower. All such oils only dissolved deposited naphthalene when they were deposited as liquids from the gas. A certain excess of the vapour of the oil when introduced into the gas dissolved existing deposits of naphthalene. If benzol was used, a great quantity was required in order that the gas might be saturated with its vapour. As soon as the saturation point was passed, the benzol began to condense from the gas, and dissolved naphthalene quite as rapidly as solvent naphtha. But there was a difference in the behaviour of the two solvents, in that gas saturated with benzol burnt with a smoky flame in an ordinary gas-burner, while gas saturated with solvent naphtha had not that objectionable quality. Thus, even though solvent naphtha were slightly inferior to benzol as a solvent of naphthalene, its use did not produce smoky flames. The cure was permanent, as the naphthalene, when once dissolved, was carried by its solvent to the nearest syphon, and was regularly pumped out therefrom. Dr. Bunte went on to say that Dr. Bueb's paper suggested to him another question—viz., that of the centralization of gas purification. Dr. Bueb stated that three purposes could be served by a "Standard" washer—viz., (1) Naphthalene could be removed by oil in the first section; (2) cyanogen could be absorbed in the second section; and (3) ammonia could be dealt with in the third section. The gas would then be purified except in respect of sulphuretted hydrogen, and the existing process for the removal of that impurity was so extremely simple, especially when revivification *in situ* was adopted, that further simplification was scarcely conceivable. But bearing in mind that the use of metallic salts for the extraction of cyanogen formed part of Dr. Bueb's scheme, it was natural to ask if sulphuretted hydrogen also could not be dealt with in the wet way, and the use of special dry purifiers rendered unnecessary. If a "Standard" washer or similar apparatus were divided into four sections, the first three would be used in the manner already described above, and the fourth section would be devoted to the removal of sulphuretted hydrogen from the gas. There was no theoretical obstacle to the removal of ammonia and sulphuretted hydrogen being carried out in one stage; and Dr. Bunte desired to draw the attention of chemists to the subject. It might be possible to make yet another step forward by utilizing the "Standard" washer for the propulsion of the gas, in place of the pumps and exhausters at present in use. It was quite possible to conceive, in place of such a washer fitted with rectilinear plates, a kind of meter or fan-like apparatus which would also serve for the propulsion of the gas; so that the mechanical action of the exhauster and the chemical actions of purification might be secured in one and the same apparatus. These ideas now appeared mere castles in the air; but if the advances which had been made of late years were kept in remembrance, it would not seem altogether improbable that, whereas they had just heard of the removal of

cyanogen and naphthalene, in the near future they would hear of the removal of sulphuretted hydrogen in the same apparatus, which would also be made to serve as an exhauster.

Herr Gellendien, of Elbing, wished to ask if the cyanide solution obtained by the new process was directly saleable.

Dr. Bueb replied that the cyanogen product obtained in the "Standard" washer was directly and readily saleable, because pure potassium cyanide or ferrocyanide could be produced from it more readily than from spent oxide. The working up of the cyanogen sludge produced at the works of the German Continental Gas Company was carried out by a Syndicate whose headquarters were at Frankfort-on-the-Maine. A contract had been made with the Syndicate, according to which the cyanogen in the liquor or sludge was paid for according to a scale based on the quotations in London or Germany for potassium ferrocyanide, just as concentrated gas liquor was sold according to the price of sulphate in the London or Hull market. This method of payment seemed quite proper, as both the buyer and the producer were affected by the fluctuations in prices.

The President supplemented what Dr. Bueb had said with regard to the disposal of the cyanogen sludge at the works of the German Continental Gas Company by explaining that the question of working up the product at the several works had been considered, but no one of them was sufficiently large for the process to be carried out remuneratively; and moreover, it had been deemed inexpedient to put new work upon the works' managers, who already had ample business simply in connection with the supply of gas and the manufacture of sulphate. The Syndicate referred to by Dr. Bueb had been formed for the purpose of purchasing and dealing with the sludge from the gas-works.

Herr Streichert, of Berlin, observed that Dr. Bueb said that gas liquor could most advantageously be worked up to sulphate of ammonia. In Berlin, however, the authorities had recently refused their sanction to the manufacture of sulphate being carried on at the Municipal gas-works in the Danzigerstrasse and in Schmargendorf. He had also heard of a similar refusal at Neu-Ruppin. He thought it would be very interesting to know if the authorities were refusing their sanction to the erection of sulphate plant in other places, because if this were so, and their action was based on the alleged injury which was caused by the escape of the waste gases into the atmosphere, gas-works which could not dispose of their liquor in its crude state would have only one course open to them—viz., to concentrate their liquor. He would like to know if any exception could be taken to the concentration of liquor on gas-works.

Dr. Bueb replied that in the manufacture of sulphate, sulphuretted hydrogen was expelled; but in the case of small works it would cause no appreciable contamination of the atmosphere if it were allowed to escape up the chimney. In the case of the Berlin or other large works, marked contamination of the atmosphere was, however, to be feared if the sulphuretted hydrogen were allowed to escape. But there were means of avoiding such contamination. In many large English gas-works, the sulphuretted hydrogen was converted, by partial combustion according to Claus's process, into sulphur. He believed that this system was in use at the works of the Imperial Continental Gas Association at Berlin. Concentrated gas liquor was precisely the same as ordinary gas liquor, only in a more concentrated condition; and sulphuretted hydrogen evolved in the process of concentration was re-absorbed.

Herr Streichert explained that permission to erect plant for working up gas liquor had been refused—in spite of the precautions Dr. Bueb had suggested—and he thought it doubtful if the production of concentrated gas liquor would be sanctioned. The discharge of the spent liquor into the public sewers was objected to, because of the sulphocyanide it contained.

Dr. Leybold, of Hamburg, referred to the disposal of the spent liquor, and said that the regulations with regard thereto differed greatly in different towns. In many cases it could be discharged into the sewer. In some cases, as at Munich, it had to be cooled, and passed through a number of settling tanks, in which chalk could settle out from it, before it was run into the sewers. Provided it was first treated in such a manner, the effluent would do no harm in the public sewers. With regard to the gases evolved, in England they were usually cooled and passed through an oxide purifier or a Claus' kiln. At the coke ovens, the gases were led into the main gas-flue after the ammonia recovery plant, and were thus consumed under the ovens, and rendered harmless.

Dr. Bunte added that at Munich the spent liquor was clarified and cooled and then run into the sewer; while the gases evolved were passed through a purifier. He believed that there was no hygienic ground for refusing permission for the erection of rationally constructed sulphate plant on a gas-works.

Dr. Bueb pointed out that if the chief difficulty were the disposal of the effluent, on account of the lime which it contained, it was feasible to work without lime and recover only the volatile ammonia: Gas liquor from many coals—*e.g.* Upper Silesian coal—had 93 to 95 per cent. of its ammonia present as volatile salts; and it was scarcely worth while to use lime for the sake of recovering the remaining 5 per cent. of fixed ammonia. If lime was not used, the only objection which could be raised against the effluent liquor being run into the sewers was that it contained sulphocyanide; but the quantity was actually so small that no harm could result therefrom.

Herr Freyer, of Neu-Ruppin, said with reference to the allusion of Dr. Streichert to the application to erect a sulphate plant there, that sanction had been obtained, but on condition that the gases evolved were completely purified and rendered odourless by being passed through a condenser and oxide purifier.

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

The Papers at the Annual Meeting.

In a previous number of the "JOURNAL," we briefly indicated the scope of the papers (of which there were twenty-six, of varying lengths) brought before the members of the above-named Society at their recent annual meeting in Paris; and in a subsequent number we gave the principal portions of Mr. Brackenbury's paper on the Arrol-Foulis stoking machinery. We now purpose dealing further with the principal communications, abstracts of which have been given in the "Journal des Usines à Gaz."

M. Ymonet read a paper on the construction of retort furnaces. He first laid down the proposition that, in refractory more than in any other kind of brickwork, it is essential to reduce to a minimum the quantity of mortar employed. It is consequently very important only to use bricks which are perfect both in shape and size. He justified this proposition on the ground that the disturbance of brickwork resulting from expansion and contraction is greater in proportion to the larger quantity of mortar used, owing to the evaporation of the water contained therein. As far as regards the construction of the abutments to support the arch, there is no difficulty. He, however, emphasized the advisability, in the case of the outer abutments, of never joining refractory to ordinary brickwork—first because the two kinds of bricks are not of the same size; and, secondly, because the refractory brickwork should be regarded as a sort of isolating covering, which should be afforded every possible facility for expansion and contraction, in order to prevent the breaking of the bricks and the consequent production of cracks and fissures. The author explained in detail the present system of constructing furnaces, and pointed out its defects. As the result of his investigations, he advised that the separating wall between back-to-back furnaces should be left entirely free to expand and contract, and should not be made to support the arch, to which all possible elasticity should be given, so as to enable it to settle as regularly as possible on the extinction of the fire and the cooling down of the furnace. In large works, such as those of the Paris Gas Company, the separating wall is dispensed with; but this necessitates the double set of retorts being at work at the same time—a condition of things which is not generally possible. The author laid stress upon the importance of having the arches of regular height, and of using special bricks to suit the curves of the arch. He also recommended the builder not to wait for the completion of the walls of the furnace before striking the centering of the arch, but to strike as soon as the keystone is in position, and the filling-in has been carried sufficiently high to form a shoulder to the arch.

The well-worn topic of "stopped ascension-pipes" and the best way to treat them was dealt with by M. Daudy. He expressed the opinion that the obstruction of these pipes is due to variation in the friction of the tarry vesicles against the walls of the pipes. He explained the cause of the formation of these obstructions, and demonstrated mathematically that the degree of friction depends upon the pressure, volume, and temperature of the gas. The next point considered was the removal of the obstructions. This the author effects at Angers by means of an appliance which he described. Upon the end of an iron bar is a cone-shaped head, furnished with spiral wings; while above the cone are fixed four cutters. On the appliance being inserted in the pipe, and worked like an auger, the wings cut into the obstruction and loosen it, and the blades finish the operation. If the trouble is dealt with in time, there is no difficulty in removing the material with the appliance; but, of course, when there is a hard mass, more difficulty is experienced. One man, however, can work the scraper, which it is well to steep in waste oil before using.

M. Brouardel described the system employed by the Centre and South of France Gas Company in regulating their retort-house work; and he also dealt with the scurfing of retorts. The author had recognized, as others have done, the inconveniences resulting from the practically simultaneous charging of all the retorts in a setting—viz., the greater tax upon the men, the unequal quantity and varying illuminating power of the gas produced at different periods of the charge, the frequent obstruction of the ascension-pipes, and the hardening of the tar in the hydraulic main. The author showed how, with charges of 3 cwt. to 4 cwt. per retort, he arranged the working of 108 retorts, divided into two groups of six settings of nine, each group having a distinct organization. The stokers were divided into two gangs of three, one taking the even, and the other the odd retorts. Charging was done by the scoop, at the rate of two scoopfuls per retort. A spell of work lasting for 40 minutes was followed by a rest for a like period. The working time was divided into two 20-minute periods, comprising the unsealing of the lids, removal of the coke, preparation of the charge, sealing the lids, and sweeping up. The time

was in this way divided into equal periods of work and rest, so as to fatigue the men as little as possible. There were never more than three retorts in a group open at once (not more than one per setting); and the charging of them in succession went on uninterruptedly, owing to the employment of the two gangs. The recruitment of the stokers, which was becoming increasingly difficult under the old system, was facilitated by the new arrangement. The method of scurfing retorts described by M. Brouardel, as mentioned in our general notice of the meeting, was not particularly novel. A main from 8 to 10 inches in diameter is placed in front of the retort-bench, and suitable arrangements are made for making a connection with any of the retorts. When scurfing is required, a bend which goes into the retort a distance of about 5 feet is brought into communication with the fixed main, and, by the aid of a blower working at about 2000 revolutions, and delivering a very large volume of air at a pressure of about 5 inches, the adhering carbon is removed. The scurfing of a retort 10 feet long requires about 134,000 cubic feet of air; and the operation takes 30 minutes. The retort is thrown out of use for only an hour at the outside; and by unsealing the lid half an hour in advance, it does not miss its turn for charging. Scurfing is done periodically at regular intervals of 15 days for the same retort; the consequence being that the layer of carbon is not very thick, and its removal is the more readily effected. It was stated that the application of the system had contributed greatly to the preservation of the retorts upon which it had been tried.

It may be remembered that some time ago the subject of the contamination of gas in holders was brought up by M. Ymonet, of Rennes, at an informal meeting of gas managers of the West of France; and he was induced to promise a paper on the subject for the meeting of the Société Technique. He offered some preliminary observations on the matter, which were noticed in the "JOURNAL" for Jan. 10 last; and he duly kept his promise with the Society. M. Ymonet found that gas which entered the holder clean left it in such a condition that it blackened lead paper. He attributed this contamination in the first place to insufficient condensation or bad washing; and, secondly, to the action of very high temperatures on the crown of the holder in summer. His paper was a very long one, and, as it scarcely lends itself to summarizing, we reproduce the advice the author gives to those who are troubled in a similar way to himself. Beginning with carbonization, he says the coal should be broken up, and distillation should not be conducted at so low a temperature as to bring about the transformation into sulphuretted hydrogen of the sulphur compounds resulting from the decomposition of the coal and of the pyrites which it may contain. The hydraulic main should be supplied with clean water, and not with ammoniacal liquor. In condensing the gas, he advises that it should never be brought, at any point in the manufacturing process, into contact with the old products of condensation. Consequently, these should be removed as they are produced, and in a direction contrary to that taken by the gas. Following up the same idea, in works where scrubbers are employed, clean water should be used for the second series of washers, and for the first series the water which has come from the second. He says Kirkham washers, or those charged with wet sawdust, are preferable to others in which washing is done by spraying, or by causing the gas to bubble through water. In purifying, the old material should not be allowed to remain too long in the first boxes; while in the catch-boxes, fresh material, which has been once or twice revivified, should be used. By way of finishing off, some boxes filled with wet sawdust should be placed just before the last in the series. There should be an intermittent, if not continuous, emptying of the water from the bottom of the gas-holder tank, which should on no account be converted into a supplementary tar-tank, which, unfortunately, is tolerably frequently done. M. Ymonet also gave some rules for testing the purity of gas. The pipe communicating with the testing apparatus should be cleared of all the accumulated or stagnant gas by allowing it to burn for half an hour at least before bringing the lead paper into contact with it. The examiner should use, by preference, dry and small test-tubes; if large ones are employed, they should be sheltered from thermometric variations, and be placed in a temperature as near as possible that of the gas to be tested. The test-paper should be slightly moistened. The movable test-tubes should be connected by means of tubing made of india-rubber as pure and new as possible; while the fixed ones should be joined by lead or copper piping. The directions given by Dumas and Regnault as to pressure and the duration of the experiment should be strictly adhered to. A second test should be made if the paper is blackened, so as to determine whether or not this is due to an accidental or a purely local cause.

M. Ymonet likewise described an arrangement of tar-tank which would not only effect the separation of the tar and ammoniacal liquor, but enrich the latter.

A paper bearing upon the subject of ammoniacal liquor was contributed by M. Chevalet. In a communication presented to the Society in 1882, the author showed the members how to ascertain the quantity of sulphuretted hydrogen absorbed by ammoniacal liquor in washing gas. He now laid before them a quick and simple method for finding the amount of carbonic acid. He employs for his purpose the Fleurent apparatus. Into the receiver he puts 5 c.c. of an acid solution of cuprous chloride, and in the stopcock tube a similar quantity of the ammoniacal liquor to be tested. In the other tube are placed a few grains of pumice-stone moistened with concentrated sulphuric acid. The apparatus, thus prepared, is accurately weighed. A small quantity of the ammoniacal liquor is then allowed to run slowly into the acid solution. The carbonates are attacked; the sulphuretted hydrogen is fixed upon the copper of the cuprous chloride; and carbonic acid is regularly liberated. The latter, before leaving the apparatus, is deprived of its humidity in the pumice-stone tube. As soon as all the ammoniacal liquor has run out, the receiver is slightly heated over the flame of a spirit-lamp, to remove the last traces of carbonic acid, and then again weighed. The difference between the two weighings represents the total quantity of carbonic acid contained in the liquor.

In a long paper by M. Lecomte, on high-power incandescent gas lighting, he deals successively with intensive burners and flames, chimneys made on his disc system, mantles and their light-emitting properties, intensive lighting by gas without pressure, the selection of an exhauster for lighting, centrifugal ventilating fans, rotary and piston pumps, exhausters on the Lecomte system for lamp-posts, recuperative burners, and arc lamps, intensive lighting by petroleum and alcohol, and other matters. The value of the numerous inventions described can only be ascertained by several months of study.

M. Fabre gave an account of the alteration effected in the lighting arrangements at the Montluçon Railway Station by the use of incandescent gas-burners. Before the change, the station was lighted by 196 flat-flame burners and 23 high-power burners consuming 19·5 cubic feet of gas per hour, equal to 502 ordinary burners. After the alteration, there were in use within and outside the station 272 Welsbach and 61 flat-flame burners; and the saving in gas was put at from 12 to 15 per cent. The gas is supplied at a regulated pressure of about 5-10ths of an inch. Since the change, one mantle per day, on an average, has been renewed. It has been found that the burners most liable to damage are those which are placed nearest the lines; the displacement of air caused by the blowing-off of steam and the whistling of the locomotives breaking the mantles at their supports. This is a defect which appears to have been remedied in the system adopted at the Waterloo Station of the London and South-Western Railway, as described in the "JOURNAL" last week (p. 295). On the whole, notwithstanding the saving of gas effected, the present lighting is far superior to the old.

Lighters were dealt with in communications by M. Castoul, M. Dulac, and M. Jouanne. The first-named gentleman described a lighter applicable to street-lamps fitted with ordinary flat-flame or Welsbach burners. In the latter case, the lighter is furnished with a bunsen burner rendered anti-vibratory by the interposition of a very flexible spring between the two cones. The system of lighting described by M. Dulac consists of a three-way tap, a lighting-tube, and an improved lighter. The tap is so arranged that, when the lever is horizontal, the gas is entirely shut off; when it stands at 45°, the gas passes to the tube; and when it is vertical, the gas goes only to the burner. The lighting-tube is so arranged that, when the lamplighter manipulates the lever of the three-way cock, his lamp passes in front of the lower part of the tube when the lever is at about 45°. The lighting of the tube is consequently effected without the lamplighter abandoning the lever. By continuing the movement, the burner is lighted and the tube extinguished. M. Jouanne described the Besnard system for automatically lighting and extinguishing gas-burners at a distance. The appliance is operated by the variations in pressure at the time of lighting and extinction; and it requires in conjunction with it a small flash-light. The author pointed out that, in order to ensure the satisfactory working of the system, it would be necessary to have an even pressure; and therefore an irregular district might present insurmountable difficulties to its introduction. Where, however, the levels do not vary, and for public lamps, large establishments, railway stations, theatres, assembly-rooms, and similar places, he thought self-lighting appliances, based upon pressure, might be used with success. In the case of railway stations, he pointed out that the system could be made to lower the lights to mere jets when the platforms were not in use, and bring them up to their full power on the arrival of a train.

M. André described a new gas-oven, for which he claimed considerable economy and excellent results in working. The oven used by pastrycooks is 3 ft. 3 in. wide, 3 ft. 6 in. high, and 1 ft. 6 in. deep; and by it a temperature of 280° C. (536° Fahr.) was obtained in 35 minutes with the consumption of 62 cubic feet of gas, and the heat was kept up by burning 35 cubic feet per hour. By conduction and radiation, a temperature of 180° C. (356° Fahr.) is obtained upon the upper shelf, and of 80° C. (176° Fahr.) upon the lower one. In another and smaller model (1 ft. 7 in. wide, 1 foot high, and 2 feet deep) the temperature was brought up to 300° C. (572° Fahr.) in ten minutes. With the consumption of 7 cubic feet of gas, all the cooking possible with an oil-stove could be done with this model, the hourly consumption of which is 35 cubic feet. M. André also described a heating-stove in which he has applied the principle of heat recuperation, and by the use of corrugated plates, giving a large heating surface, has obtained very economical results.

In a paper on "Gas and its Competitors—Past, Present, and Future," M. Syssoyeff offered some general observations on the various lighting agents now employed—gas, electricity, petroleum, and acetylene. It appears that some of the figures in his

comparative table of consumptions require correction, as they differ materially from the results obtained by the great majority of observers in France and Germany. M. Victor dealt with the subject of charging for electricity, and described an appliance for recording the number of hours during which a consumer has used more current than was arranged for in the agreement with the suppliers. M. Jouanne described a new method of jointing pipes, of lead, rubber, or any other malleable material. The ends to be joined are opened by an expander (after having had conical rings placed upon them), and then fitted on to a double cone. The ends are brought together, the rings drawn upon the cone and clamped, and the joint is made.

WESTERN (U.S.A.) GAS ASSOCIATION.

The Annual Meeting at Milwaukee.

(*Concluded from p.* 308.)

Mr. F. H. Shelton, of Philadelphia, read a paper on the "Distribution of Gas at Higher Pressures." While water and steam were distributed at pressures up to 300 lbs. per square inch, he could not help wondering whether there was any good reason for limiting gas to a fraction of a pound pressure. According to the recognized rules, a pressure of 5 lbs. per square inch would increase the capabilities of a distributing system eight times, and 20 lbs. sixteen times. The cost of compressing the gas to a few pounds per square inch would not be great; and the saving in outlay for mains would be large. He did not think moderate compression would injure the gas; and if the whole system of mains required to be overhauled —why, the majority would be better for a thorough overhauling. If ordinary socket joints proved too weak, they could be covered by a light iron sleeve, made in two parts, and packed with cement. For new work he strongly advocated wrought iron, which was successfully used by the natural gas people for distributing at high pressures. If well coated, and laid with care and judgment, it would last many years. Lead joints could not be depended on to remain tight under high pressures; but cement joints would do so. It would, of course, be urged that high pressures would increase risk of danger in case of leakage or fracture of pipes; but this did not seem to hinder the distribution of natural gas, Pintsch gas, steam, ammonia, and other gases that were certainly equally dangerous. He would not admit high pressures inside houses, but reduce to the usual limits by a suitable regulator on each service. In concluding, he quoted practical examples of the successful distribution of gas at high pressure.

Discussion having been invited, Mr. Butterworth said he understood that, at Louisville, natural gas was distributed from a loaded gasholder at 10-inch pressure. Mr. Runner remarked that for ordinary use, wrought-iron pipes, or cast-iron pipes with cement joints, were a great advance on ordinary lead joints. Mr. Gimper thought there were several objections to the plan of distributing at 10 lbs. pressure or weighting an ordinary holder to give that result. Mr. J. R. Lynn remarked that the proposed plan would mean more loss by leakage and by condensation. Natural gas, having already been highly compressed, had nothing more to lose; but the case was different with artificial gas which had not been compressed at all. It was one thing to start with a gas already compressed, and another to produce the compression artificially. He also remarked that water-gas tar was an excellent preservative for wrought-iron pipe. Mr. Elbert said that increasing the velocity of the gas in the pipe would certainly increase naphthalene trouble. That was the experience at Los Angeles. Mr. J. A. Mayers questioned whether there was anything in the suggestion. The cost of compression, attention to regulators, and the difficulty of dealing with escaping gas under high pressure, would more than counterbalance any saving. Mr. Ferrier pointed out that the natural gas people used district regulators, and not one on every service. Mr. Doherty said that the distribution could be increased sixteen times by enlarging the pipe fourfold; and in many cases it would be simpler and cheaper to replace a 1-inch by a 4-inch pipe without altering the pressure. The accepted formulæ did not apply to very high or very low pressures; and there was some doubt as to the actual effect of a sixteen-fold increase of pressure as regards the increase of delivery. What he had suggested, and would like to see tried, would be a small high-pressure pipe carried inside an ordinary gas-main. Reliable and cheap pressure regulators were on the market, so that would be no difficulty; and it would be a decided advantage to supply at a uniform pressure. Nor was he afraid of increased liability to explosion. He was doubtful, however, as to cost of compression. Mr. Wheeler said that at Danbury a 2-inch pipe, 4 miles long, had carried compressed gas for years, and caused no trouble from leakage or naphthalene. He saw no reason whatever why gas companies could not adopt the plan. Mr. Baehr was successfully supplying gas through about a quarter-of-a-mile of 8-inch pipe at 30 inches pressure, and had no trouble from leakage. It occurred to him that rather than go to the expense of practically re-laying the existing system to fit it for high pressure, a high-pressure system could be gradually introduced to supplement the existing arrangement.

Mr. Shelton, in replying, said a little fact was worth a lot of theory; and that a few days before he visited Danbury, where the system he suggested was in practical use. For about half cost, they secured double delivery as compared with ordinary mains. For the supply of outlying districts, the plan was certainly preferable to distance gasholders. None of the difficulties prophesied had been experienced there. Only the previous day he saw the Pintsch plant at Chicago, which supplied gas at 200 lbs. pressure to a system of over 30 miles of main. The cost of compression would be well within 1d. per 1000 cubic feet. He thought these accomplished facts should be carefully considered by gas engineers, and that there was a future for hig h-pressure gas distribution.

Mr. Irvin Butterworth read a paper on the "Use of Vitrified Clay as a Substitute for Cast Iron in the Manufacture of Gas-Main Pipes," as suggested by Mr. H. L. Doherty, of Madison. The proposition was that ordinary glazed pipes, as used for sewer construction, would be cheaper, stronger, non-corrosive, bad conductors of heat or electricity, and non-porous. From a table he showed that the cost of the pipes would be about one-fourth that of cast iron, or one-eighth that of wrought iron; but as the lengths would only be 4 feet, more joints would be required. He therefore reckoned that the saving would not be more than 40 per cent. when laid complete.

Mr. Shelton opened the discussion, and claimed that cast iron was not "more or less porous." Good cast iron was perfectly sound, and that under heavy pressure. The clay pipes would require very careful watching when other contractors were working in their vicinity. Clay pipes had been used in the East; and a proposal had been put forth to make glass pipes. Mr. Eaton read the results of some tests of vitrified salt glazed pipes for crushing and for bursting strength.

Mr. Butterworth, in replying, pointed out that he made no claim for superiority as regards non-porosity. He had simply said that the vitrified pipe was as non-porous as cast iron. He understood fibre pipe was not much cheaper than iron, and it was certainly more costly than glazed pipe.

In connection with the Question Box, a long discussion took place as to the best way of supporting and protecting main pipes on bridges. Mr. Gimper had used non-conducting felt covered with canvas well tarred. Mr. Chollar had boxed the pipes in, and used an expansion joint at each end. Mr. Morgan spoke strongly in favour of fibre pipe for exposed positions. After trying all the other known expedients, he considered this the best. Mr. J. F. Lynn preferred to use naked wrought-iron pipes, with expansion joints at each end. Covering or packing of any kind attracted moisture, and if not perfectly dry was worse than useless. Sharp elbows should be avoided, and the curves, if necessary, made as easy as possible. Mr. Murdoch and Mr. Dunbar supported this view. Mr. M'Millan thought it important that the pipe should be of ample size for the work to be done. On the subject of minimum monthly bills, Mr. Walker presumed the question applied to users of combination fixtures who depended on the gas simply as a safeguard in case of emergency. He always charged 100 cubic feet whether used or not. Mr. J. H. Farrell made a minimum charge of 10d. under the circumstances, and other speakers 1s. Mr. Jenkins showed by going into details that the interest and depreciation on cost of service and meter, establishment charges, &c., was not less than 1s. per month; and therefore it was only fair that the consumer should pay this sum, even if he had not used any gas. Mr. T. D. Miller advocated a minimum charge of 2½d. per month per light, according to the nominal capacity of the meter. Mr. M'Millan said that, after explaining the position to his customers, they did not object to a minimum charge of 1s. per month. On the disposal of tar, Mr. M'Millan recommended using it as a fuel; and Mr. Atwater said it was worth 1½ times its weight of coal for the purpose. He alluded to the manufacture of briquettes in Europe, and did not see why tar could not be utilized in this way. Mr. Butterworth knew no way of getting better results from tar than by distilling it. Mr. Odiorne gave the results of his experiences in canvassing, and fitting up small houses with gas at the cheapest possible cost. In reference to an inquiry as to whether 60° Fahr. was a correct temperature for use as a standard in connection with the indications of the station meter, Mr. J. R. Lynn objected to the introduction of corrections in any shape as likely to lead away from accuracy rather than towards it. The gas was sold under ordinary conditions; and if the make was corrected, the sale ought also to be corrected. But, in any case, an arbitrary figure was of no use. If anything, a fair average for the particular locality should be used; but even this was open to serious disadvantages. Increasing the sales per mile of main, looking for leakages, &c., would reduce loss and increase earnings; but corrections at the works were no profit at all. Mr. Gimper was obliged to make corrections, as his station meter was in an exposed position and subject to variations of temperature. He found it necessary to take several readings of the thermometer daily, and adjust accordingly. Mr. Bredel said that statements made for purposes of comparison with other works should always be adjusted to 60°. Mr. Doherty agreed; and regarded 60° as a fair and convenient standard. Mr. Jenkins said that, for the purpose of ascertaining the quantity of gas unaccounted for, the average local temperature was more likely to be correct than an arbitrary standard. On previous occasions, he had shown that the average selling temperature was near to 50°.

A resolution embodying the usual votes of thanks was passed, and the meeting closed.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Autumn Visit of the Institution of Gas Engineers to Berlin and Copenhagen.

SIR,—In order to facilitate the necessary arrangements for the reception and comfort of the members, I shall esteem it a personal favour if those members of the Institution who purpose joining the party will signify their intention to the Secretary of the Institution *at the earliest possible date.*

F. D. MARSHALL.

Copenhagen, Aug. 3, 1899.

Carburetted Water Gas at Belfast.

SIR,—Without the slightest intention of discussing the cost of carburetted water gas, I must ask your permission to correct a mistake which my kind and complimentary friend Professor Ivison Macadam has fallen into in his lecture reported in your current issue. The figures relating to the cost of carburetted water gas are not mine. They were published in a small pamphlet, on carburetted water gas, issued by Messrs. Humphreys and Glasgow, some time, I think, in the year 1894—as an outside estimate of the cost of producing carburetted water gas. They are very much in excess of anything resulting from my own experience, as a comparison with results of experiments in my Gas Institute paper in June, 1894, will show.

JAMES STELFOX.

Belfast, Aug. 2, 1899.

The Hastings Carburation Process.

SIR,—I note on p. 293 of the "JOURNAL" of the 1st inst., under the heading of "The Naphthalene Question, and the Recovery of Bye-Products," the following paragraph: "The Dessau experiments would seem to indicate that the process used there is considerably cheaper than the Messrs. Botley's carburation process;" but I have been unable, from the figures given, to find a confirmation of this statement.

The figures given for Dessau, on 706,000 cubic feet, indicate a cost for oil only of 0·045d. per 1000 cubic feet. Compared with this, it is only fair to take the years 1897 and 1898 of the Hastings process, dealing with 747 millions, when the average cost per 1000 cubic feet of gas sold will be found to be 0·030d.—50 per cent. less than at Dessau.

The cost of oil used in 1896 was exceptional; benzol, light spirit, and many other more expensive oils, having been used experimentally.

CHAS. F. BOTLEY.

Hastings, Aug. 3, 1899.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill reported, with amendments: Bradford Tramways and Improvement Bill.

Bills read the third time and passed: Belfast Corporation Bill, Bradford Tramways and Improvement Bill, Derwent Valley Water Bill.

Bills Royal Assented: Ayr Burgh Bill, Birmingham Corporation Bill, Blackpool Improvement Bill, Bristol Gas Bill, Gas Orders Confirmation (No. 1) Bill, Gas and Water Orders Confirmation Bill, Glasgow Corporation (Gas and Water) Bill, Godalming Corporation Water Bill, Goole Urban District Council Bill, Lea Bridge District Gas Bill, Loughborough Corporation Bill, Lowestoft Water and Gas Bill, Menstone Water Bill, Redditch Gas Bill, South Hants Water Bill, Stockport Corporation Water Bill, Totland Water Bill, Walker and Wallsend Union Gas (Electric Lighting) Bill, Water Orders Confirmation Bill, West Gloucestershire Water Bill, Whitehaven Corporation Bill, Woking Water and Gas Bill.

Last Friday, Lord Morley announced that the promoters of the Stockport District Water Bill do not intend to proceed further therewith.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Lords Bills read the third time and passed: Fylde Water Board Bill, Gas Orders Confirmation (No. 2) Bill, Great Yarmouth Water Bill, Salford Corporation Bill, Wakefield Corporation Bill, Wolverhampton Corporation Bill, Workington Corporation Bill.

Last Thursday, Dr. Farquharson moved the discharge of the order made by the House on the 13th of March for the second reading of the London Water (Welsh Reservoirs and Works) Bill of the London County Council. This was agreed to. The Bill, it may be remembered, came before the House for second reading on the 21st of March; but the motion was rejected by a majority of 76. The measure has now been formally withdrawn.

Projected Gas-Works Extensions at Blackpool.—A proposal to borrow £66,000 for gas-works extensions came before the Blackpool Town Council last Tuesday, and was referred to the General Purposes Committee. It was pointed out in the discussion that since 1892 the manufacture of gas had risen from 192 million cubic feet to 384 millions, or just double in seven years. The profits handed over to the rates in 1892 amounted to £4310; while last year the sum was £10,800.

A Bonus for Halifax Gas Workers.—The Halifax Town Council were asked by the Gas Committee last Wednesday to confirm the following minute: "That an agreement be signed by each workman employed at the gas-works, and that a bonus of 2½ per cent. upon the wages paid be given at the satisfactory termination of each agreement." In reply to a question, Alderman Woodhead said that the agreement would not be compulsory upon the present employees. The minute was approved.

LEGAL INTELLIGENCE.

JUDICIAL COMMITTEE OF THE PRIVY COUNCIL.

Friday, July 28.

(*Before Lord* WATSON, *Lord* HOBHOUSE, *Lord* MACNAGHTEN, *Sir* EDWARD FRY, *and Sir* HENRY STRONG.)

Montreal Gas Company v. Cadieux—Cutting Off a Consumer's Gas.

This was an appeal from a judgment of the Supreme Court of Canada of May 6, 1898, reversing a decision of the Court of Queen's Bench for Lower Canada (Appeal Side), and restoring a decree of Mr. Justice Mathieu. The question raised in the appeal was thus stated: "If gas-rent is in arrear, have the appellant Company the right to cut off the supply of gas from, and refuse to supply gas to, not only those premises in respect of which the rent is in arrear, but also from and to all other premises in the same occupation, though there is no rent in arrear in respect of gas supplied to the last-mentioned premises?" The Company supplied gas to the respondent, Mr. Cadieux, at two premises in his occupation—one in St. Charles Borromée Street, and the other in Notre Dame Street—in Montreal. He paid the gas bills in respect of the former but not of the latter; and after giving him warning, the Gas Company cut off the gas from both places. The respondent thereupon brought an action against them. Mr. Justice Mathieu decided that the right of the Company to cut off the supply was limited to the premises in respect of which payment was in arrear. The Court of Queen's Bench, on appeal, reversed this decision; holding that the Company's charter gave them the power to terminate their supply of gas to the different premises of a person who neglected to pay his gas bill for a portion of the premises supplied. The Supreme Court—Mr. Justice Taschereau dissenting—set aside this judgment, on the ground that the power to cut off gas only applied to the particular premises in respect of which the arrear arose.

The Hon. EDWARD BLAKE, Q.C. (of the Canadian Bar), appeared for the appellants; Mr. M'MASTER, Q.C. (of the Canadian Bar), and Mr. LOEHNIS represented the respondent.

The arguments were addressed to their Lordships on the 14th ult., and at their close judgment was reserved. It was given to-day, and was reported by "The Times" as follows:—

Sir H. STRONG said the appellant Company made and supplied gas in Montreal, and were incorporated by statute. The respondent was a customer of theirs. He had two sets of premises in Montreal—viz., 1125, Notre Dame Street, and 282, St. Charles Borromée Street, where he resided. He had gas from the Company for both. The question was whether he was entitled to require the Company to supply gas for the one set of premises while he neglected to pay his gas bill for the other. The answer must depend upon the statutory powers of the Company. Originally they had no special power bearing on the question. But in 1849 their powers were extended by a statute of the Province of Canada (12 Vic., cap. 183), so as to enable them to deal with defaulting customers. Section 20 of the Act of 1849, which was evidently borrowed from the Gas-Works Clauses Act, 1847, was, so far as material, in the following terms: "If any person supplied with gas by the Company shall neglect to pay any rate, rent, or charge due to the Company at any of the times fixed for the payment thereof, it shall be lawful for the Company, on giving 24 hours' previous notice, to stop the gas from entering the premises, service pipes, or lamps of any such person, by cutting off the said service pipe or pipes, or by such other means as the Company shall think fit." Then followed a power for the Company to recover the amount due to them at the time, notwithstanding any contract to furnish for "a longer time," and also a power, within certain hours of the day, to enter the premises and remove their own property on giving 24 hours' previous notice "to the occupier or person in charge." The respondent was not altogether a desirable customer. He was tardy and irregular in his payments. Between February, 1890, and December, 1896, the Company had to send him fifteen notices threatening to cut off his supply before the accounts were paid; and on five occasions they had to cut off the supply for non-payment. On Sept. 19, 1895, the Company were compelled to cut off the gas at No. 1125, Notre Dame Street for non-payment of the bill for gas supplied to that house. This measure had no effect in producing payment. The Company then gave the respondent notice that unless their bill was paid they would cut off the gas at his residence in St. Charles Borromée Street also; and at last, after repeated notice to this effect, they carried their threats into execution, and cut off the gas at both houses. Instead of paying what he owed to the Company, the respondent brought this action to compel them to continue the supply of gas to his residence. Mr. Justice Mathieu, sitting in the Superior Court, decided in his favour. The Court of Queen's Bench unanimously reversed that decision. The Supreme Court (Mr. Justice Taschereau dissenting) set aside the judgment of the Court of Queen's Bench. The case appeared to their Lordships to be too clear for argument. The only question was one of fact: Was the respondent, in the words of the Act, a person supplied with gas by the Company who had neglected to pay a rate, rent, or charge, due to them at the time fixed for the payment thereof? It could not be disputed that he was. The occasion, therefore, had arisen which authorized the Company to stop the gas from entering his service-pipes. There was nothing in the Act to limit the right of the Company to the service-pipes of the defaulter in a particular building, or connected with a particular meter, in respect of which the default had been committed. There was nothing in the Act to throw the rate, rent, or charge for gas upon the premises for which the supply was furnished, or to make it payable out of the premises of the defaulter. The supply was to the consumer, and the default was the consumer's. His liability to the Company was for the whole of the debt which he owed them at the time. The argument of Mr. Justice Girouard, who delivered the judgment of the Supreme Court, seemed to be this: The power given to the Company of stopping the supply of gas to a customer who neglects to pay his gas bill is an "exorbitant" power. The provision must, therefore, be construed strictly. The only reasonable way of construing it is to limit the power to the particular building in respect of which the default has been committed; any other construction would lead to unreasonable consequences. If a corporation, for instance, took

a supply of gas for their streets and also for their public buildings, it would be unreasonable to cut off the supply for the streets merely because the corporation neglected to pay the gas bill for their buildings. Their Lordships were unable to see anything unreasonable in the particular instance given, or anything unreasonable in a provision authorizing a gas company to cease supplying a customer who would not pay his gas bills. But the real answer to the argument of the learned Judge was that it was not for the Court to pronounce an opinion upon the policy of the Legislature. Their only duty was to give effect to the language of the Legislature—construing it fairly. It seemed impossible to find the limitation in question in the language of the statute without introducing some proviso or some qualifying words which were not there. In the result, therefore, their Lordships would humbly advise Her Majesty that the appeal ought to be allowed, and that the respondent ought to pay the costs in the Courts in Canada. There would be no costs of the appeal to Her Majesty.

HIGH COURT OF JUSTICE.—QUEEN'S BENCH DIVISION.

Friday, Aug. 4.

(*Before Mr. Justice* Day *and a Special Jury.*)

Ilford Gaslight and Coke Company v. Locke.

This was an action for libel against the "Ilford Guardian," in respect of an article published on Feb. 18, 1899.

Mr. Dickens, Q.C., and Mr. Macaskie appeared for the plaintiffs; Lord Coleridge, Q.C., and Mr. Morten represented the defendant.

Mr. Dickens, in opening the case, said the plaintiff Company was incorporated in 1839, when Ilford was a very small place, and was subsequently registered under the Companies Acts. In 1873, 1881, and 1894 the Company obtained powers from Parliament for increasing their capital. Of late years Ilford had grown very rapidly, and the demand for gas had risen from 29 millions in 1894 to 76 millions in 1898. It was necessary to go to Parliament for power to raise further capital in order to enlarge the mains; and the usual notices were given. In the meantime, in order to meet the demand at the limits of the district, it was necessary that considerable pressure should be put on at the works, though it would be shown that nothing abnormal or excessive had been used. At the end of 1898, the Urban District Council of Ilford conceived the idea of buying the plaintiffs' undertaking; and having summoned a meeting of the owners and occupiers, and obtained their approval, a Bill was promoted for the purpose—the Company having declined to sell by agreement. It was just at this time, and when notice had been given of another meeting for the purpose of authorizing the Council to oppose the Company's Bill for additional capital, that the article appeared of which complaint was made. It was headed "The Gas Scandal," and it stated that many complaints had been made by consumers that their gas bills for the Christmas quarter were much in excess of those for the corresponding quarter of the previous year, although no more light had been used. It was suggested that the plaintiffs had been raising the pressure, and forcing more gas through the pipes, in order to increase their revenue, in view of a possible purchase by the Urban District Council, with the object of augmenting the price to be paid. But whether the charges made were legal or not, as to which there were doubts, they were at any rate unjust; and the ratepayers were urged to attend the forthcoming meeting, and protest vigorously. Of course, he did not complain of the advice to attend the meeting, or of any fair comments on a public question; but he submitted that some of the passages were clearly libellous, as they practically amounted to charges of fraudulent conduct. When the attention of the Directors of the Company was called to the article, a letter was written demanding a retractation and apology; and as nothing of the sort appeared, the writ was issued. He might add that, in the result, the Company's Bill was passed, and that of the District Council thrown out.

Mr. *W. Ashmole*, the Chairman of the Company, said he was a large owner of property in Ilford. Before going to Parliament recently, the total capital expenditure of the Company was £67,000. From 1895 to 1898 there was a great deal of building done in the neighbourhood; and he had prepared a table showing the sales of gas for several years. In 1888 they were less than 16 millions; in 1894, 30 millions; in 1895, 37 millions; in 1896, 47 millions; in 1897, 58 millions; and in 1898, 76 millions. The majority of the new houses were small, and rented at from £20 to £30 a year; and many of the occupants used gas for cooking as well as lighting. In the early part of 1898, the Company determined to go to Parliament for further powers. The District Council opposed the Bill; but it was passed notwithstanding—the capital being extended to £300,000. The Council promoted a Bill for buying up the Company's undertaking. It was opposed by the Company, and defeated. The Ilford district was very flat; and this necessitated more pressure being applied than if the ground rose from the works. It was not entirely to the interest of the Company to put on excessive pressure, as it tended to cause leakage. In the early part of 1899, some complaints were received; and in every case an offer was made to have the meter tested. In some cases it was accepted; but in only one instance was the meter found to be in favour of the Company. There was no foundation for the suggestion that the increase of pressure was applied for any other reason than to secure an adequate supply of gas throughout the area. There was no truth in the statement that in hundreds of cases, where only the same light had been supplied, the charges had been nearly double. There had been no increase in the price. At the time the article appeared, a meeting had been called for Feb. 21, to determine whether or not the Council should oppose the Company's Bill. It was decided to oppose it; and this was done, which put the Company to great expense.

Cross-examined: The Company had succeeded in throwing out the Council's Bill and in passing their own. He believed that, in consequence of the article, many people did not lay on gas who otherwise would have done so. Nevertheless, the undertaking was progressing very rapidly. He suggested that throughout the defendant was prejudiced against the Company. [The learned Counsel, Lord Coleridge, read an article of Nov. 19 referring to the scheme for buying out the Company.] Witness said the article was perfectly fair. The Gas Company put forward their views in the "Guardian," or, rather, some of the Directors did. He did not know that any such articles had been refused insertion. Mr. Denney, the Secretary, had sent letters. He generally read the defendant's paper. Someone connected with the Company issued a leaflet referring to certain of the statements of the Council as "inspired bunkum." A Committee was formed to oppose the scheme of the Council, of which Mr. Watson Dyer was Chairman. He was not paid anything at the time; but he believed he had received something since. At the beginning of 1899, there were something less than 50 complaints about the increase in the charges for gas; and a public meeting was called about it. Mr. Faulkner and Mr. Drury had written letters to the paper complaining of the increased charges, and pointing out that, owing to the larger revenue derived by the Company, a higher price would have to be paid if the undertaking were purchased. Mr. Watson Dyer suggested in the paper that the Council would charge 4s. 6d. per 1000 cubic feet for gas—that was the maximum in their Bill. The Company's maximum was the same. Mr. Faulkner, in a letter to the paper, suggested that the Company were putting on increased pressure in order to show a larger revenue. There was a greater pressure at the end of 1898 than in the corresponding quarter of 1897. Increase of pressure would drive the gas faster through the pipes; and if there were any leakage in the services, the consumers would have to pay for gas from which they derived no benefit. On the 27th of March, the defendant's Solicitor wrote suggesting that, as the Company had been successful in Parliament, the action should be discontinued; the parties paying their own costs. The Company did not accede to this suggestion, as they thought there should have been an apology.

Re-examined: In the case of several of the complainants, there was the same proportionate increase on the Lady-day as on the Christmas quarter. The high pressure was necessitated by the smallness of the mains, for the enlargement of which the additional capital was required.

Mr. *John Clark*, Manager of the West Ham Gas Company, said the pressure he found necessary there was 2 inches at the end of the district, in order to secure an adequate supply of gas for stoves. This was as low as it was safe to work at to give a satisfactory supply. In the daytime there was a demand for gas for stoves, which made up for the smaller quantity required for lighting. At the works they had a pressure of 30-10ths by day and 55-10ths at night. There was nothing improper in having a pressure of 20-10ths by day and 35-10ths at night at Ilford.

Cross-examined: When the mains were too small, higher pressure at the works was necessary. He should not be surprised to hear that the mains at Ilford were too small. The houses near the works would have more pressure than those farther off. If the mains were enlarged, less pressure at and near the works would be required. Consumers could regulate the quantity of gas passing the burner by the tap, or by having a regulator.

Re-examined: His experience was that at the outside of a district consumers complained that they did not get sufficient gas. Then the mains were enlarged, and they got enough, but complained about having to pay for it.

Mr. *James H. Brown*, Manager of the plaintiffs' works, said the pressure during 1898 at Ilford was from 15-10ths to 20-10ths in the daytime, and from 30-10ths to 35-10ths at night. This was not at all unusual, but rather below the average in similar districts.

Lord Coleridge did not call any evidence.

Mr. Dickens again addressed the Jury; pointing out that there had been no apology or withdrawal, and that unless the plaintiffs obtained a verdict for a moderate amount, which was all he asked, the defendants would be able to say that all the gross charges they had made were true. He again went through the facts stated in his opening, and insisted that the plaintiffs had done nothing but their duty, and were entitled to be protected against such unfounded accusations as had been brought against them.

Lord Coleridge, in a brief speech, contended that the article in question was only fair comment on a matter of public interest. The facts referred to were undisputed, and until they were explained, which had only been done now, they certainly called for inquiry.

Justice Day, in summing up, explained to the Jury that anything which tended to bring persons into hatred, ridicule, or contempt might be held to be a libel; and it was entirely a question for them whether or not the article in question, which he invited them to read through carefully, was libellous.

After a short consultation, the Jury returned a verdict for the defendant, on the ground that the article was fair comment.

His Lordship gave judgment accordingly.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Thursday, Aug. 3.

(*Before Mr. Justice* Bucknill, *without a Jury.*)

Crays Gas Company v. Bromley Gas Consumers' Company—A Question of Boundary.

This matter was last before the Court on the 11th ult. (*ante*, p. 182), when the case for the defence was summed up.

Mr. Littler, Q.C., Mr. R. M. Bray, Q.C., and Mr. Clarke Williams appeared for the plaintiffs; Mr. Cripps, Q.C., M.P., Mr. Danckwerts, and Mr. Vaughan Williams represented the defendants.

Mr. Danckwerts now argued the defendants' case. He said the main point on which they relied was that, but for section 48 of the Bromley Gas Company's Act, any such contract as was alleged by the plaintiffs, if it had been made (which defendants denied), would have been *ultra vires*, and not binding on the Companies. Therefore, unless his Lordship was able to find a contract within the four corners of the section, there could be no contract binding on the defendant Company. He submitted that his Lordship could not legally give effect to any contention of the plaintiffs, unless he found, as a fact, that there was an agreement in writing, such as was referred to in section 48, between the two Companies. There could be no binding agreement otherwise than in writing. The Company's Act incorporated the Gas-Works Clauses Acts of 1847 and 1871, under both of which the public in the district had certain rights as against the Company. They were entitled to call upon them to supply

gas within specified limits; and therefore his Lordship, in construing any section of this sort, must remember that it was not alone a question of the rights and powers of the Company which had to be considered, but their liabilities and duties towards the public. Therefore, any such agreement as was alleged would be *ultra vires*, because the Company were binding themselves not to exercise powers which had been committed to them for the public good; and they could not, by any contract, bind themselves not to exercise those powers. This was the effect of a number of authorities which he quoted.

Mr. LITTLER, replying on the whole case for the plaintiffs, said he was surprised that his friend should put forward such an argument as he had done. In all the cases he had quoted, a railway company had property for public purposes, and they had contracted that they would alienate it to some private purpose. What had this to do with two companies who both had rights for the benefit of the public, and one of whom agreed not to exercise its powers so long as the other did? The public obtained all they wanted; but the principle involved in the quoted cases was that the public did not get what they were entitled to. It really seemed to him that it was hardly worth while considering the argument. This was a class of contract made by hundreds of companies, and had never been set aside as between them. The only person who could set it aside was a consumer who claimed to be supplied by a particular company. He did not hesitate to say that all over the country, without any section 48 or anything of the kind, there were plenty of cases where such agreements as the one in question had been made. It was only right that it should be so, where the public policy had been indicated by Acts of Parliament. By the General Act of 1847, there was no power whatever to compel the supply of gas. It was only under the Act of 1871 that such power was granted; and this agreement was made in 1865. Therefore the whole of his learned friend's argument went by the board, because there was no obligation at all in 1865 to supply gas. Section 48 was, as far as he knew, an absolute exception to the rule, because Parliament, if they knew of it, never allowed any two companies to compete over the same ground. The history of the matter commenced in 1864; and he pointed out that it was Mr. Robinson Latter, the Chairman of the Bromley Company, who first approached Mr. May, of the Crays Company. The whole thing started with concert and concord between the two Companies; and was it in the least degree improbable that gentlemen of such experience as Mr. May and Mr. Latter would suggest and agree to such a ludicrous arrangement as that now put forward by the defendants? The first suggestion to enter into a deed of arrangement as to the boundaries of the Companies' districts first came from the people who were now repudiating any such agreement. Was it otherwise credible that the Bromley Company's Act would have been allowed to pass without any opposition? On Dec. 5, Mr. May, like a prudent man, wrote to Mr. Latter that he should like to see him about settling the district of each Company. This was before the Bills were deposited. Was it possible that Mr. May, who took such precautions, should afterwards become so careless that he should neglect to secure a proper agreement, and thereby fail in his duty to his Company? This was a matter almost of life and death for the Crays Company; and it was impossible that the arrangement could have referred to Chislehurst only, as the defendants alleged. The fact that there must have been some understanding of the kind suggested by the plaintiffs was proved by Mr. Osborne, the former Secretary of the Bromley Company, writing in 1881 to the Secretary of the Crays Company, asking him to send a copy of the "boundary arrangement." This was a strong link in favour of the plaintiffs' version of the matter—first, that there was such an agreement; and, secondly, that it was in writing. This was only 16 years, not 35 years, after the arrangement of 1865; and he submitted that this was a distinct recognition of the fact that there existed such an agreement. At the conclusion of the learned Counsel's speech,

Justice BUCKNILL intimated that he would give judgment in a few days.

A Lamplighter Fined.

A lamplighter named Jacob Jones, in the employ of the Devonport Gas Company, was summoned last Wednesday for doing wilful damage to a torch, valued at 3s. 6d., and for leaving work without notice. Defendant, it was stated, lit some of the lamps, and then absented himself, with the result that part of the district for the lighting of which he was responsible was left in darkness for several hours. The Magistrates' Clerk held that the claim against the defendant for a week's wages in lieu of notice should be made the subject of a civil action. For damaging the torch, he was fined 1s., together with the amount of the damage; and he was ordered to pay the costs.

Incandescent Gas Lighting in Birmingham.—On the recommendation of the Public Works Committee, the Birmingham City Council last Tuesday agreed that incandescent gas-burners should be provided in the street-lamps in the most important thoroughfares and at special points where extra lighting was required.

New Water Scheme for Leominster.—At the meeting of the Leominster Town Council last Tuesday, it was decided to apply to the Local Government Board for power to borrow £5000 for the purpose of carrying out a new water scheme. The proposed scheme includes the erection of a double reservoir, with a capacity of 200,000 gallons, a new iron tank to hold 25,000 gallons to supply the high-level districts, a new rising main, and a duplicate set of new engines and boilers. It is estimated that the saving which will be effected in labour and fuel by the erection of the proposed new machinery will amount to about £133 a year.

Winding Up the Newtown (Mon.) Water Company.—The final meeting of the Newtown Water Company, consequent upon the acquisition of the works by the District Council, was held last Tuesday, when a dividend of 5 per cent. was declared. The Chairman (Mr. R. Lloyd) explained that the works were transferred to the Council on June 24, when £27,616—the amount awarded by the Arbitrator—was paid to the Company, together with £789, being the taxed costs of the Company in the arbitration. The Directors were taking the necessary steps to wind up the affairs, and hoped to be able to present to the shareholders a detailed account showing the position of the finances, and to distribute the amount payable to the shareholders during the month.

MISCELLANEOUS NEWS.

THE GASLIGHT AND COKE COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held at the Chief Office, Horseferry Road, Westminster, on Friday—Colonel W. T. MAKINS (the Governor) in the chair.

The SECRETARY and GENERAL MANAGER (Mr. John W. Field) read the notice convening the meeting. The seal of the Company was affixed to the register of shareholders; and the report of the Directors, given, with the accounts, in the "JOURNAL" last week, was presented.

The GOVERNOR: Ladies and Gentlemen,—In proposing that the report and statement of accounts be received and adopted, I shall, I am afraid, have to trespass rather more than usual upon the patience of the meeting. I will first confine my observations to the working of the past half year and the routine business, and will keep my observations within as narrow limits as I can. The gas-rental shows an increase of £65,603; but of this, £40,000 is due to the advance in price which came into force on the 1st of April. The increase in the amount of rental actually resulting from increased sales of gas has been £25,203, or 1·63 per cent., as compared with 1·66 per cent. for the corresponding half year of 1898. When I tell you that the number of our consumers of all classes shows an addition of 20,414, or 6·3 per cent., over June, 1898, you will be again surprised to hear that the state of the weather has been adverse to an increase in the consumption of gas. With such a large additional number of consumers, we should naturally look, of course, for a larger output of gas; but the weather has been against it. This is fully borne out by the officially published figures of temperature and sunshine; the increase in the daily temperature having been 0·79°, and the increase in bright sunshine 156 hours, or nearly one hour a day. So that, allowance being made for this item of weather, and the nature of our district of supply, the increase in the sales of gas must, I think, be considered tolerably satisfactory in a district which extends far less rapidly than that of some of our neighbours. On the expenditure side of the accounts, the first item is that of the increased cost of coal as compared with the corresponding period of 1898. The increased cost per 1000 cubic feet of gas made amounts to 1·36d.—the result of the advance in the price of gas coal which commenced in the spring of last year, and is still going on. Until there comes some slackening off in the general trade of the country (which I think we shall all hope will not be the case), we must not expect to buy our coal at a lower price. Fortunately, the same causes which have brought about the advance in the price of coal have influenced in our favour the price of coke and other residuals; and we have been able to secure a better return for our residuals per 1000 cubic feet of gas sold, amounting to 1·70d. We have therefore actually obtained our coal at a net less charge of ¾d. per 1000 cubic feet of gas sold than in the corresponding period of June, 1898. As I have said, there is not much prospect of cheaper coal; and I am also enabled again on this occasion to say that there is no sign of any reduction in the prices of our residuals. We have just sold our Beckton coke at an advance of 2s. 6d. per ton on last year, which is more than sufficient to meet the extra cost of coal. The expenditure on wear and tear account has been very heavy. One special item of £19,000 is the value of plant demolished at Fulham to make room for the carburetted water-gas plant which is now in course of erection there. I may remark in connection with this matter, that some companies are adopting to a much larger extent than we are the system of supplementing coal gas by carburetted water gas, and are thereby effecting some economy in their coal account. But, as I have observed before—I think, more than once—until we know what legislation the Government propose to introduce, based on the report of Lord Belper's Committee on Carburetted Water-Gas Manufacture, the Directors consider it would be unwise to unduly extend their oil-gas plant. Moreover, on the one hand, the price of both Russian and American oils have been raised fully 50 per cent.; and on the other hand, the price of coke—the most important feature in the production of carburetted water gas—has advanced 50 per cent. within the last two years. So that carburetted water gas is only economical, for purposes other than enrichment, where the cost of coal is especially enhanced by lighterage or other charges. Again, the recent action of the Lords Committee in rejecting our Bill will compel us to husband our small balance of uncalled capital. There is again an increase in rates of £4156; but this is a matter over which the Directors have no control. The public elect the Rating Authorities; and they must bear both directly and indirectly whatever increase of the burden, in the shape of rates and taxes, their representatives put upon them. The quinquennial re-valuation for purposes of assessment within the Metropolis will shortly be made; and we shall endeavour, as usual, to prevent the Valuation Authorities from unduly increasing the assessment of the Company's property; and if this can be effected without going to Quarter Sessions, well and good. But if not, the last experiment of the Company before that tribunal was not such as to deter us from appealing to it again, should we be unable to obtain a fair and equitable settlement before the several Assessment Committees. The shareholders will have observed that, for the first time, there is a small charge in the accounts under the head of management for an assistant to the Company's Auditors. The Directors have always been most anxious that the audit of the Company's accounts should be thoroughly efficient; and they have readily accepted the appointment by the Auditors, under the Companies' Clauses Consolidation Act, 1845, of an assistant, whose work will be not to relieve the Auditors of any part of their duties, but rather to enable them to extend the scope of their audit. The arrangement which the Company has made with regard to the Workmen's Compensation Act, 1897, has worked satisfactorily; but the Directors, in common with other employers, have ground for complaint that, owing to the obscurity of some of the clauses of the Act, there is far too much costly litigation. The amount charged against the fund (of £2500) which has been set apart to meet claims under the Act during the past half year, has been only £993; and £174 out of this £993 has been expended in law costs—that is to say, 20 per cent. on the amount paid in compensation. So much money spent in litigation can be neither good for the workmen nor the Company; the only people who benefit are that estimable body of men, learned Counsel and

Solicitors. The further capital which was raised by the Company at the beginning of the year—amounting to £187,500 of ordinary stock and £150,000 of debenture stock—has entailed an addition to the charge for interest and dividend for the past year; but the total charge for capital has been slightly reduced. Then the net result of the working for the half year has been a profit sufficient to meet the statutory dividend of £4 18s. per cent. per annum, and to add £85,798 to the amount of undivided balance brought from the year 1898—carrying forward to the current half year the aggregate sum of £139,557. I shall have something to say on this matter when dealing with the rejection of the Company's Bill in Parliament. Turning to the figures of our capital account, which is now given in a very simple and concise form, you will find in Statement No. 3 that the amount expended during the past half year has been a net sum of £66,266. The items are sufficiently shown in the statement, and require only one word from me—that is, that practically the whole sum expended has been so spent in providing the necessary mains, meters, and stoves for additional consumers; and for the reasons which I will give later on, the expenditure during the current half year will be kept as nearly as possible to the same figure. The amount of uncalled capital in Statements Nos. 1 and 2, you will find to be: Ordinary stock, £250,000, debenture loan £200,000—or a total of £450,000; and adding a possible premium of £20,000 to £25,000 that would give us capital to the extent of about £475,000. I now have to refer to the rejection by the Committee of the House of Lords of the Company's Bill for additional capital powers. The object of the Bill was, as the shareholders are well aware, to obtain power to raise, as required from time to time, £3,500,000, and to secure additional lands for the purpose of the Company's business. As the whole of the capital was to be raised by debenture stock (and in this respect the Company was once more the pioneer in cheapening the cost of raising additional capital), the proposal was naturally wholly in the interest of the consumers. The shareholders would have benefited by the raising of the capital on these terms by the merest fraction. The Bill passed the Committee of the House of Commons with only one alteration—that is to say, the 3½ millions was cut down to 2½ millions; and the third reading of the Bill in the House was carried by a majority of 71. The Lords Committee heard the Company's case, and evidence in support of it. Counsel for the Corporation and the London County Council respectively having been heard—but without calling or offering any evidence whatever in support of their statements—their Lordships declared the preamble of the Bill not proved. Thus a Bill of the most favourable character possible for the consumers of gas has been lost certainly for one year; and not only so, but as the Directors had postponed their application to Parliament for additional capital to a late date, they are now obliged to adopt two courses which are at present, and must continue to be, antagonistic to the interests of consumers of gas. First they will have to postpone the wide adoption of steam-stoking machinery or other economical systems of carbonizing, until parliamentary capital powers are obtained for the purpose; and, secondly, as the Company will be short of capital for the ordinary expenditure necessary to meet the daily increasing demands for gas, we shall be obliged to retain in our hands, and use temporarily as floating capital, whatever surplus profits the present price of gas supplies, instead of devoting such profit to a reduction in the price of gas. I may say that had the Bill not been rejected—had it been passed by the House of Lords in all its stages—looking to the result of the half-year's working, I should have been in a position to-day to make an announcement with reference to a reduction in the price of gas. But we do not feel able at the present moment to make any such announcement; and the loss of our Bill is the cause which may postpone the reduction to a longer period than would have been the case had the Bill been passed. The works and plant of the Company will be maintained in full efficiency, and all improvements which can fairly be charged against revenue will be carried out from time to time. In view of the uncertainty of the future with respect to capital powers, we do not feel justified in spending the balance of our capital except for the purpose of meeting the demands of the district for the supply of gas—that is to say, our statutory obligations. The amount of the undivided profit is, as I have told you, £139,000; and this would have justified us, as I said a moment ago, in making the announcement with regard to an early reduction in the price of gas. The result of the loss of the Bill is most regretable; and it throws a strong light upon the action of the members of the London County Council and the City Corporation, who, whatever may be their intention—and I do not question their *bona fides* for a moment—do not, and cannot, advance the interest of the public, but only hamper and hinder us in carrying out our statutory obligations under our Acts. I may mention one fact which is very gratifying to the Directors, that is the great increase in the amount of street lighting by the incandescent system. We have now made arrangements with some of the parishes to substitute incandescent gas burners and mantles for the present flat-flame burners. The result, I know by experience in many streets, is perfectly marvellous as regards the light given; and I believe it will tend not only to the improvement of public lighting, but also to economy, for the light will be got for a smaller amount of money. I will now deal with the questions raised in the report of the Committee on the Powers of Charge of the Metropolitan Gas Companies, which was recently presented to Parliament, and as briefly as the importance of the subject will permit. The proprietors will remember that this inquiry arose out of the allegations made by the Chairman of the South Metropolitan Gas Company against our management and policy from time to time, and notably in February, 1898. The Committee was moved for by Mr. Cohen, a Metropolitan member, and was constituted as follows: Seven Metropolitan members and eight Provincial members, making altogether 15. Sir James Rankin, Bart., was elected Chairman. He discharged his duty with singular fairness and efficiency; and he showed a desire to make himself acquainted with the details of a difficult question with which he had no previous knowledge. The Committee was not a judicial body, as a whole, possessing the experience necessary for threshing out evidence. The evidence was not given on oath, and neither party nor the Committee had the assistance of Counsel. There was no one on the Committee representing the Company; whereas there were seven members who represented more or less those whom I may call the attacking parties. The witnesses for the Company were severely cross-examined by some of the Metropolitan members; but the witnesses on the other side escaped with very little, I may say with practically no, cross-examination. The Committee was therefore in no real sense a judicial tribunal; and its recommendations can only be given effect to after full and exhaustive examination by a judicial Committee acting upon sworn evidence, and with the help of learned Counsel, as is the case with all Bills which come before Parliament. The Committee sat thirteen times; but the average attendance of the members was small, and it was not always possible even to maintain a quorum of five members. On one occasion, we sat till after mid-day, and were then dismissed; on another occasion, we sat till after mid-day, and then a bare quorum was obtained. The Metropolitan members who would naturally consider the question of cheaper gas from their constituents' point of view, were the most regular attendants. If it had been desired to give strength to the Committee, and confidence in its recommendations, why was there not added to it some member or members who were conversant with the gas industry as carried on in the Metropolis, and the legislation governing the Companies? There are two well-known and able members of the House of Commons who are Directors of Metropolitan Gas Companies—our colleague, Mr. John Aird, and Sir John Colomb, a Director of the Commercial Gas Company. They could have given much assistance if placed upon the Committee. They could by cross-examination have cleared away some of the fallacies which seem to have been accepted by the Committee on the mere allegation of the accuser. I can give you an analogous case. A Commission is sitting to inquire into the question of accidents on railways due to the coupling and uncoupling of trucks; and besides other experts who sit upon the Committee there is Sir Charles Scotter, an able and experienced Railway Manager, who sits there and represents the Companies, and sees that the evidence is properly put before the Commission. He cross-examines such witnesses as it would appear to him necessary, in order to bring out the truth. Under these circumstances, and considering the composition of the Committee, can it be wondered that we are quite unable to accept the implied censure of the Committee or the force of its recommendations, though, of course, we do not for one moment challenge the *bona fides* of those members who attended the Committee and formulated the report? I do not propose to go through all the questions which were brought before the Committee. I will not take you through all the paragraphs of the report, but will content myself with three or four of the salient points, and then deal with the recommendations of the Committee. The main complaint which we have to make of the Committee's finding is that they appear to have absolutely ignored some of the strongest points put forward by the Company. For instance, no mention is made of the evidence given as to the very large increase of business which has taken place in the South Metropolitan Company's district as compared with ours. The key-note of our explanation of the high price we charge, and almost always had to charge since the settlement of 1876, and I may say before that time, when the difference was almost exactly the same as it is at present—the key-note of our explanation was the heavy capital charge coupled with the low rate of increase in gas sales. It is a fact that while the South Metropolitan Gas Company have during the past 23 years increased 240 per cent., our increase was only 110 per cent. I may also point out that this is an increasing ratio of difference; for what does it amount to in the past half year? While our increase is only 1·63 theirs is 4·7, or three times as great. This, it was pointed out, has a tremendous effect upon the capital employed per ton of coal carbonized; but not one single reference is made to this strong point in the Committee's report. It was further given in evidence that the whole of the obsolete capital expended some years ago at Beckton was taken into consideration by Mr. Forster's Committee in 1875, and allowed for in fixing our capital and standard price; and yet we are to blame for the expenditure of this ancient capital, and it is suggested that you (the shareholders) should be penalized as a consequence. No notice is taken of this most important fact; and we are saddled with the responsibilities for errors—if they were errors—of our predecessors early in the century. It would be equally fair and reasonable to blame Mr. Goschen and the present Board of Admiralty for the inefficiency and obsolete capital represented by the old wooden ships of years gone by. Changes and improvements are continually taking place in every kind of industrial plant and machinery. Even at the South Metropolitan Company's works, there are ancient monuments of our forefathers, which are now obsolete. The Committee recognizes this, and say they think in years gone by there has been wasteful expenditure of capital by the Gaslight Company; but this cannot be remedied as far as the money is concerned. Mr. Livesey reiterated his charges of incapacity and mismanagement; but the Committee did not ask for, nor did Mr. Livesey give, a single fact in support of these allegations. He accused vehemently; but he furnished no date or circumstances which we could have the opportunity of either testing or refuting. Why Mr. Livesey should have taken this course is inexplicable. He did not benefit a single person by so doing; but he knocked 10 or 12 per cent. off the market value of our property. Where the benefit comes in to anyone, it is impossible to conceive. I do not envy his feelings when he considers what an amount of pain and anxiety he must have caused to those of limited means who have, on the faith of an Act of Parliament, invested their capital in this Company. I should be very sorry to have to share those feelings with him. However, there it is; and I will now proceed to the remedy which he suggested. He proposed, in defiance of what he describes as the "sacred principle" of the sliding scale, that we should reduce the dividend at once to 4 per cent., and hand over the other 18s. to the consumers, so as to give a reduction of 1¾d. per 1000 cubic feet. This would have involved a loss to the shareholders of £135,000 a year, or a drop in the capital stock of the Company of £2,700,000. In illustrating our alleged incapacity in the purchase of coals, Mr. Livesey gave an instance, which is referred to by the Committee, of our having lost £100,000 by making our purchase of coals at what he considered was not the proper time. This allegation is—to use the mildest description I can apply to it—an hallucination, and which it is perfectly impossible to prove. What can be proved, and was given in evidence, is the fact that from 1892 to 1898 the cost of coal to this Company has been reduced to the extent of 3·6d. per 1000 cubic feet of gas made, against a reduction of 2·7d. in the case of the South Metropolitan Company. I will not further weary you with describing the class of evidence thus tendered to the Committee and apparently accepted by them without corroboration. The question of the reduction in the price of coal is an

evidence certainly not of incapacity and mismanagement. I now come to the report. One point which appears to tell against us is that we have, by using up our reserves, postponed a rise in the price of gas. Here we have the old fallacy that the depletion of the Company's reserve fund was for the purpose of keeping up the dividend. The fact is that the amount withdrawn from the reserve fund was £510,788. In compliance with the law, it was apportioned to the public—in obviating, not postponing, thereby an increase in the price of gas—£429,865; and the shareholders had £80,933 in dividend. It was not applicable under the law to any other purpose. These two amounts together make the sum withdrawn £510,788. It is much to be regretted that a popular fallacy such as this should receive the countenance of a Parliamentary Committee. Moreover what we did was done with the entire concurrence of the Public Auditor, who is the Government officer appointed to see that we do comply with our Acts of Parliament, and do not give anything to the shareholders over and above what they are entitled to. We are also able to point out this material piece of evidence, and the desire of the Company to act liberally towards its consumers when we had sacrificed practically the whole of our reserve fund and the maintenance of a low price of gas in those years when the cost of production was abnormally high. We showed the Committee that had this course not been adopted, the price of gas during the past nine years would have been seriously higher than it has been. Another point was the form of the construction of the Beckton holders. This we admitted was, in the light of modern experience, possibly an error of judgment on the part of our predecessors in 1869 or 1870. But as I have said, the cost (whatever it may be) of those gasholders was considered and allowed for in the settlement of 1876; and it is too late to go behind that, and say that the shareholders who, on the faith of the settlement of 1876, advanced their capital, should be penalized because before 1876 mistakes were made in the early history of the Company. The main point, however, is probably that we are charging 9¼d. per 1000 feet more than the South Metropolitan Company. But although the information was in evidence before them, the Committee have throughout their report ignored certain other facts—that in 1868 (31 years ago), after a prolonged inquiry extending over some years, when the Company was before Parliament, and obtained their Act of that year, the difference in price between the two Companies was about 10d.; that in 1872, when the Company obtained further capital powers by their Act of that year, the difference in price between the Companies was again about 10d.; that in 1876, when the Company obtained further capital powers, and this after two years' discussion before a House of Commons Committee, the difference was again about 10d.; as it is this day, and as it probably ever will be. Thus the condition of things as regards price is practically the same as it was on those three previous occasions when the affairs of the Company were reviewed by Parliament. Certainly Mr. Cardwell's Committee and Mr. Forster's Committee were not likely to have overlooked this point; and it must be presumed that the settlements then effected were made after taking into account the practically differential price, which the Committee appear to think has only arisen in recent years. Now, just to show how history repeats itself, I will refer to two very short remarks made by a well-known Gas Director and Chairman, the late Mr. Gray, at a meeting of the South Metropolitan Gas Company on Oct. 10, 1865. Mr. Gray said:

It appeared to him that all the circumstances of this Company [that is, Mr. Livesey's Company] were pleasantness, and that its paths were peace. He was much gratified at its continued prosperity; nevertheless he could not help reflecting upon the fact of the great injury that this increasing prosperity was inflicting on the other Companies in London. Speaking as the Chairman of one of those Companies, he did not envy the South Metropolitan their great success; but he confessed that he should have been much better pleased had that success not been so conspicuous, for it was a constant source of uneasiness and agitation in other places. He need hardly remind his friend in the chair——
I forget who was the Chairman at that time——

Mr. Livesey: It was Mr. T. B. Simpson.
The Governor (continuing reading)—

He need hardly remind his friend in the chair that for a long period after their establishment the Company paid no dividend at all. To this circumstance must be in some degree attributed the small dividend-paying capital invested in the undertaking. He thought the equitable course would be to open a debtor and creditor account with the old shareholders, and carry to the credit of that account the amount of dividend they ought to have received when they ceased to be proprietors. It was mainly to the circumstance he had alluded to that there had been such a great accumulation of wealth. The Company had, in fact, been carried on by paying for the erection of works with the money which should have originally been divided among the shareholders. That being the case, it could not be a matter of surprise to any of those whom he now addressed that other Companies which had constructed their works by making calls on the proprietors were not in such comfortable circumstances as the South Metropolitan.

In 1869 he said—

There is one advantage which you enjoy over every other Company in the Metropolis, and that is an advantage arising from locality, the effect of which is that you are able to supply gas cheaper than the Companies by whom you are surrounded. I almost lament the necessity which you are under to reduce the price of gas; for it must be perfectly evident to everyone present that a reduction in the price of gas on the south side of London must lead to an agitation for a reduction of price by other Companies which are not so well situated as you are. That, however, is a circumstance over which the Directors have no control.

I merely read these extracts to point out to you how exactly the position of thirty years ago resembles the position we are in to-day; and it is not due to persistent incapacity and mismanagement, but to the very elastic nature of the district which the South Metropolitan Company supply, and to the fact that their capital per ton is so much less than ours. In paragraph 31, the Committee sum up the opinion "that the affairs of the Company have not been well managed"—an opinion formed in spite of the fact that the cost of gas making, which, of course, embraces the purchase of coal and the sale of residuals, has been reduced by this Company to a greater extent than has been the case of either of the other Metropolitan Gas Companies. This fact cannot be challenged so far as the history of this Company is concerned since the parliamentary review of its proceedings in 1875 and 1876. In paragraph 32 the Committee admit, and in this paragraph they give the first evidence that they recognize, their inability to deal with the complicated question of want of uniformity in the price of gas in the Metropolis; for they wisely decline, in the interests of the Company, to give any direction as to the management of gas companies, although in the preceding paragraph they did not hesitate to confess what they here admit must be left to the judgment of those responsible for the management. Paragraph 32 deals with the southern districts; but Mr. Field, in his evidence, never admitted that the loss to the Company south of the river was 2¼d. He carefully declined to deal with the figures subsequent to the last report published in 1898. If the Committee accepted the unsupported statement of Mr. Hunt, who had no access to the Company's figures, rather than the evidence of the Company's responsible advisers, the conclusion arrived at could not but be open to question. Certainly, in 1898 the trifling loss on the south of the Thames was made good by the sale of Nine Elms gas on the north. We are not wishful to combat the recommendation of the Committee on the point; and if, after discussing the matter in the usual way, Parliament should consider that the area south of the River Thames should be transferred to the South Metropolitan Company, and a Bill is brought in for carrying out this recommendation to enable the Gaslight Company to sell, and the South Metropolitan to purchase, the southern district and the Nine Elms station upon fair and equitable terms, to be settled by agreement, or, failing agreement, by arbitration, this Company will offer no opposition to such a measure. But, in the interests of their consumers and their shareholders, any such transfer must be upon equitable terms, and not in any confiscatory manner. Indeed, the Committee laid that down in their report. The Committee's view of the cession of such a district showed how difficult it was for them to grasp the knotty questions of capital and rates. As a matter of fact, the transfer could not affect the Company's rate per 1000 cubic feet by the smallest possible fraction. In paragraph 34, the Committee enter upon what is, I believe, admitted by all the representatives of gas companies to be most dangerous ground. They express their readiness to recommend Parliament to set aside the bargain which it has made with investors in gas stocks, and upon the faith of which millions of money and stock and premium thereon has been subscribed. In the case of this Company alone the sum of £2,500,000 has been so subscribed; and these premiums, which you know carry no dividend, have very considerably increased owing to the larger dividend payable under the sliding-scale clause of 1875 and 1876. These larger dividends could not have been paid had it not been for the exercise by the Directors of such due care and management as has resulted in a large reduction in the cost of manufacture, and a corresponding reduction in the price charged to the consumer. I have already told you that, as regards these reductions, this Company, notwithstanding the fact that the Committee have not once referred to them in their report, compares most favourably with other Metropolitan Gas Companies; and gas companies who have scrupulously fulfilled their part of the parliamentary bargain of 1876, who have all made large reductions in price, are now to submit to a reduction in the standard rate of dividend, of what is nothing short of a confiscation—I use the word advisedly, though not offensively—of so much of the market value of those stocks as represents the value of the reduction proposed to be made in the initial price of gas. This reduction would be, in the case of this Company, £1,500,000. The Committee suggest some secondary or "telescopic" sliding-scale, which appears to have been drawn up either by or for Mr. Livesey; for it is so neatly calculated that the South Metropolitan Company would suffer no diminution of dividend if it were adopted. I now come to the recommendations of the Committee, which are five in number. You will find them described in paragraph 32 of the report as suggestions to enable The Gaslight and Coke Company to lower its price. Of these five recommendations, only one can be expected to produce that result—viz., No. 2. That is the one which speaks of the cession of the southern district. That is the only one of the five recommendations which can, apart from what I have called confiscation, possibly reduce the cost in the production of gas. The other four, unless retrospective action is to be given to No. 1, would have an opposite tendency—that is, to increase the cost of production, and consequently to increase the price of gas. No. 1 recommends that, whenever any of the Metropolitan Gas Companies again come to Parliament for an extension or alteration of their capital powers, a revision of the sliding-scale should take place, and that the standard price should be reduced to 3s. 3d. to carry the standard dividend of 10 per cent. This revision must apply either to the new capital raised, and not to the old capital, or it must be retrospective. The wording admits of either construction; and the Committee among themselves, and the public outside, seem, as recorded in "The Times," to differ in opinion as to which is intended. I will examine it on both hypotheses. If it is to apply to only the new capital, no objection can be advanced. If Parliament thinks it right that such an experiment should be tried, we must bow to their decision, and only point out that if the value of the return for invested capital is diminished, the public will not give at the auction sales the same amount of premium bearing no interest, and that, in consequence, the charge for capital will be increased, and therefore the cost of production and the price for gas must also be increased and not lowered. If the revision is to be retrospective, and to apply to the capital raised in accordance with, and on the faith of, the provisions of the Act of 1876, which fixes the security on which the then authorized capital was to be raised, a most momentous and far-reaching step in reference to the security of a parliamentary compact will be taken. It will not only affect the Gas Companies in London and elsewhere, but all companies trading under parliamentary enactments—railways, docks, canals, water companies, improvement companies, and many others. In our case, the retrospective action would be peculiarly oppressive, immoral, and unjust, because, as you will see, in the capital account (No. 3), a sum of £1,582,800 has been raised by the Company from purchasers of stocks at auctions under the promise, and upon the security of, our Acts, which were read over in the auction-rooms. The recommendation would involve a reduction of 10s. per cent. in the statutory dividend—it would reduce it from 98s. per cent. now payable at the present price of gas (3s.), to 88s., and a reduction in the saleable value of the stock equal probably to £1,600,000. And all this disregard for the good name of parliamentary bargains, and for the security of capital issued at a high rate of premium on the public faith in the continuity of the policy

of the Board of Trade, as explained by Mr. Farrer in 1875, is for what object? To reduce the price of gas in the district north of the Thames by less than 1d. The reduction of 10s. per cent. is equal, on the £15,000,000 of capital, to £75,000; that is what you shareholders would be called upon to give up. One penny per 1000 cubic feet of gas amounts to £80,000. Therefore, for a reduction in the price of gas of something less than a penny, it is suggested that this great wrong should be inflicted upon those who have subscribed capital in good faith. It is not the case of doing a little wrong to do a great right, but doing a little right to do a great wrong. This proposal, drastic as it is, falls far short of Mr. Livesey's suggestion, which was to make an immediate reduction to 80s. per cent.; and though equally in principle it would involve repudiation, it would carry the penal consequences of the Act very much farther. I do not believe that Parliament would ever take such a course; and I think it is almost an insult to the Legislature to suppose it could be capable of giving its sanction to the spoliation of *bonâ-fide* investors, whose money had been advanced on the faith of their own legislation. If the revision is to be prospective only, it is not in our case likely to arise for some time to come. It would hardly become a question of practical politics for many years. Parliament has followed the general practice, in regard to companies raising capital, of granting power to borrow on debentures or debenture stock to the extent of one-third of the capital issued. Our share capital raised is £21,392,990. Our present loan capital is £4,123,975. We shall in our future applications for capital, which we shall make from time to time, take the same course as we did last year, of seeking to raise it by borrowing on debenture stock. The amount under the scale which I have just given you would be about £7,000,000 to bring our borrowed capital up to the proper ratio with our share capital. Therefore you will see it would last for very many years; so that we should not be the first probably to try this experiment of the "telescopic" sliding-scale with the reduction. Recommendation No. 2 relates to the cession of the southern area; and I have already dealt with that. Recommendation No. 3 deals with the regulation of meters and fittings. It is all very well for the Committee to recommend uniformity of rates for the hire of automatic fittings. They should first make some attempt at least to settle what is meant by fittings. Is every stove let out to our 300,000 consumers to be classified and rated? Who is to undertake such a task? Who is to see that the stoves are equal to the standard? Is there to be a revision whenever the market prices of iron, material, or labour rise or fall? In any case, I cannot see but that the effect of this recommendation would be not to reduce but to certainly maintain, if not increase, the price of gas by increasing the cost of production. Recommendation No. 4 relates to a quinquennial revision. This is a recommendation which will defeat its own object if adopted. Under the sliding-scale and auction clauses, to obtain the best price for the stock a fixed permanent form of security is necessary. The recommendation provides "that capital powers should not be granted to any Gas Company for more than five years, if and when new capital is required; and that Parliament should revise the sliding-scale, either by way of increase or decrease, when any application for new capital is made, if the circumstances of the times or the conditions of the Company appear to require it." If that is to be retrospective, it will defeat itself, because, under the sliding-scale and auction clauses, a fixed permanent form of security is an absolutely necessity. People will not invest in gas stocks on a five years' agreement as to the dividend, except at a very low figure, any more than they will take a house or farm for a very short term at a high rent. Stability is the very essence of a permanent security. The Committee have lost sight of that most important factor—the investing public and their requirements; and thus again the charge for capital and cost of production and the selling price of gas would all be increased if this recommendation were adopted. The last recommendation is as to the sinking fund: "That an effort should be made by any Company having obsolete or unproductive capital to redeem such capital by sinking fund or otherwise." A sinking fund in our case is already in existence. Under the authority of the Board of Trade, settled some time ago, we now set aside £6000 a year out of reserve to redeem obsolete capital. Of course, this might be increased to any extent—say, to £60,000; but the result would be that by so much the revenue would be reduced, and the increase thereby *pro tanto* would be placed on the cost of production. And that certainly would not tend to lower the price of gas. Moreover, why should the consumer of to-day pay more for his gas in order that the consumer of fifty years hence should pay less? I cannot, for the life of me, see what advantage there is in such a policy as that. I have now finished my remarks upon the report; and I have only a few more words to say. First of all, I must apologize for this long and imperfect statement to-day. I felt that it was only due to you, seeing what an effect the publication of that report has had on your property, that I should go as exhaustively as time would allow me, from our point of view, into the matter. I beseech you not, in a feeling of panic, to part with your valuable property. Parliament may, and in fact sometimes does, err. But, after all, it is the fountain of justice; and our case is so unimpeachable as regards morality and equity that I have no fear of revolutionary confiscation receiving its sanction. We are meeting you with a good half-yearly report, but under the shadow of this implied censure by the Committee. As long as we retain your confidence, we shall remain at our post, and devote our best abilities to your service; but should you think that the policy of taking away your dividend in the hope of selling cheaper gas under impossible conditions is a policy which merits your approval, then we shall ask to be excused from carrying on our duties, and shall resign our trust into your hands. There is only one word more that I have to say, and that is to discharge a debt of gratitude to Mr. Field and the staff of the Company—a debt of gratitude due both from us and from you. The manner in which Mr. Field has fought the fight, whatever may be the result, is beyond all praise. His industry and his entire devotion of time to serve you, no one knows more fully than I do. I shall carry with me, as long as I live, a recollection of his unstinted devotion to the service of this Company. I hope that he and we may now have a short period of rest, and that when the Blue-Book is issued, I trust you will all study the evidence and the attendances and voting of the members, and the report, and then put your own value on the result of the Committee's deliberations, before you think of parting with your stock. With renewed apologies for troubling you so long, I beg to move that the report and statement of accounts as now submitted to the meeting be adopted.

Mr. Howard C. Ward (the Deputy-Governor) seconded the motion.

Mr. Walker said, as a holder of £10,000 worth of ordinary stock, he might perhaps be permitted to make a few remarks. The Governor had dealt at some length—but not too long—with the report of the Committee which had recently been published. Those who had attended the Company's meetings during the last ten years knew how, from time to time, the proceedings had been enlivened by remarks made by Mr. Livesey, and the answers given by the Governor. Sometimes the shareholders had enjoyed it; and sometimes they thought Mr. Livesey's conduct was not such as they themselves would have pursued under the circumstances. But as shareholders it was not for them to consider the conduct of an objector to the management; as shareholders it was their duty to welcome every solid well-founded objection to the conduct of the Board. When he (Mr. Walker) learned that a Select Committee had been appointed to inquire into the difference in the charges made by their Company and those of others—especially the South Metropolitan Company—he looked forward with some interest to the report, because he knew he should have the opportunity of reading that the charges made by Mr. Livesey against the Board were not well-founded. In this he had not been disappointed. After dealing at some length with the various matters touched upon in the report of the Parliamentary Committee and the recommendations, he said his own opinion was that no case had been made out against the Gaslight Company, and that no definite conclusion had been come to by the Committee. The Company was in a good condition; and he hoped the shareholders would not be persuaded through panic to part with their shares. He had no fear at all of Parliament interfering with them.

Mr. H. Hounsom said the present was a time of great anxiety to the Company; and whatever views they might take upon the report of the Parliamentary Committee, he thought it was a serious document. Nothing had pained him more than the way in which a possible reduction in price had been dealt with that day from the chair. The fact was serious enough that the Company's Bill should have been rejected; but the fact was still more serious that the rejection should be made a reason for penalizing the consumers, and deferring a reduction in price. He did hope to hear that the Board had sufficient pluck, in spite of the fluctuations and upward tendency of the coal market, to announce a reduction in price from the last meter-taking. Consumers on the north side of the water paid a far greater amount for gas than on the south side. After what had transpired, he thought there should have been on the part of the Board a determination to do a little for the consumers. It was all very well to say that so much had been done for them; but, instead of looking at one party alone (as the Board seemed inclined to do), they ought to give the consumers some little pledge that they had some sympathy with them. If he were in order, he should move that a reduction of 2d. per 1000 cubic feet should be made in the price of gas as from the last meter-taking.

The Governor asked whether that was intended as an amendment to the motion for the adoption of the report.

Mr. Hounsom said he proposed it as an addendum.

The Governor said he could not take it as such. The report dealt with the proceedings of the half year, and the distribution of the dividend. If a resolution of this kind were proposed, it must be done after the report had been adopted.

Mr. Hounsom said, with the Governor's permission, he would move his resolution later on.

Mr. C. E. Jones said he must congratulate the Governor upon his lengthy and lucid exposition of the affairs of the Company; and he also congratulated the Board upon the increase in the consumption of gas during the recent tropical weather. This increase was evidently due to the anxiety of the public to cook by gas, and also to use it for motors. He hoped encouragement would be given to this branch of industry, so that the Company might have further reason to congratulate themselves at their next merry meeting. He might be permitted to utter a word of warning with regard to the residuals. He had already stated in that room on a previous occasion that the price of coals would go up; and he further predicted that they would never get coals cheaper than they were getting them last half year. This prediction had been amply verified. Residuals were a very fluctuating item with them, and had the stability of a will-o'-the-wisp. He would warn the Company not to place too much reliance upon the probable increase in revenue from residuals. Dealing with the proceedings of the Parliamentary Committee, he said he was of opinion that too much had been made of it. Such Committees were very human altogether; and inasmuch as they had had an inquiry, the shareholders were entitled to express their opinion about their representatives in and out of Parliament. In his opinion, this was a very amateurish Committee indeed. As it was the practice for the Appeal Court to reverse the decision of the lower Courts, he would suggest that Parliament should revise the findings of this Committee. There was no mistake about the recommendations; and it would not be at all sensible for them, as shareholders or otherwise, not to see the hand-writing on the wall. That hand-writing meant "Lower Price of Gas." There was no question about that to his mind. He therefore did hope that due regard would be paid to this very important item; and that no attempt would be made, except under the direst necessity, to increase the price of gas. He hoped the time was not far distant when the Board would be able to make an announcement of a reduction in price. The Board had the sympathy of the shareholders for the very arduous time they had had during the last six months, and for the very able manner in which the affairs of the Company had been conducted. Although he differed somewhat with them on the question of price, he hoped, with all due deference, and without tying the Board to any definite resolution, that some inducement would be held out to the public of a reduction in the immediate future.

Mr. George Livesey said he could not be silent on this occasion; but he did not intend to go into personal matters, nor defend himself against the charges which had been made against him, as he was content with the verdict of the Committee. The Committee had accepted his evidence; and with that he was perfectly content. But it was not quite correct to say that his attack on the Company, as it was called, in February, 1898, was the cause of the Committee being appointed. To his mind, the cause was the high price of gas; and the increase in March last from 2s. 10d. to 3s. was the "last straw," which culminated in the parishes or local authorities pressing for the appointment of a Committee. He asked for a Committee of Inquiry of the shareholders; but that the

Governor would not grant. He was challenged to move an amendment upon the subject; but he did not do so knowing that the Directors had a pocketful of proxies. It was the custom of the Board to send out for proxies to those gentlemen who would support them—at least, he so inferred; for the Board had never asked him for one. With regard to the remarks of Mr. Gray, which the Governor had quoted, he might say that at the time these remarks were made, he (Mr. Livesey) was not responsible for the management of the South Metropolitan Company, though he was an officer. But he might tell them that the statements of Mr. Gray were utterly fallacious. Mr. Gray was an old gentleman whom he respected for his personal character; but as regards managing a Gas Company he was utterly incompetent.

The GOVERNOR: Like ourselves, I suppose.

Mr. LIVESEY said Mr. Gray's criticism amounted to this: The South Metropolitan Company, which was situated in an isolated position, was able to sell gas cheaper than Companies that were in a different position to themselves. That this was due to better management, he would agree; but Mr. Gray was evidently angry with the South Metropolitan Company for reducing their price. Dealing with the report of the Committee, he (Mr. Livesey) said that, in his opinion, it was an exceedingly able report; and in this opinion he did not stand alone. Whatever Mr. Walker might say to the contrary, men who had had large experience in gas matters, and who had spoken to him on the subject, all agreed that the report was an exceedingly able document; and it was a document which the Gaslight Company would not easily get over. No one had contended more strongly than he had with regard to the inviolability of the initial price under the sliding-scale; but there was a precedent for it being altered this very session. Lord Camperdown (who presided over the Committee who dealt with the Lea Bridge Gas Bill), after he had heard the evidence, carried a reduction of the initial price to the extent of 6d. per 1000 cubic feet. No doubt there were peculiar circumstances in that case. Lord Camperdown said that considering the advantages the Committee were giving in the way of consolidation of stock, and the further advantage of the increase of capital to a considerable amount, and that they would be able to raise this new capital at a low rate of interest, which would inure to the benefit of the Company, he thought they should give something to the consumers; and therefore he reduced the initial price from 5s. to 4s. 6d. He (Mr. Livesey) admitted that the 5s. was very high. But the case was argued by one of the ablest men who practised before Parliamentary Committees (Mr. H. E. Jones); and he argued the matter with Lord Camperdown. Two members of the Governor's own Court (one of them was Chairman and the other a Director of the Lea Bridge Company) assented to the verdict of that Committee. He did not find fault with them for doing so. But he thought if he had been in their shoes—it was a matter of maintaining the inviolability of the initial price—the Bill would have been withdrawn. He merely stated the fact that they did accept the opinion of that Committee; and they took their Bill through the next House. So that for the first time since the sliding-scale was introduced in 1875, Parliament had altered the initial price. That was really an important precedent; and now this Committee had adopted it in their recommendations. The first conclusion of the Committee was no doubt the most important, in which they spoke of the reduction of the initial price of the London Gas Companies from 3s. 9d. to 3s. 3d. per 1000 cubic feet. Now, clause 31 of the report was so important that he asked the shareholders to have patience while he read it. It stated that: "The Committee have very fully considered all the evidence submitted to them; and, after giving due weight to the reasons offered by the Gaslight and Coke Company, in explanation of the higher price charged for their gas, they are of opinion that the affairs of the Company have not been well managed." The intention of the sliding-scale was to give to the consumers a special interest in economical administration, while the control was left exclusively in the hands of the Company. Hence there was an implied obligation on the part of the Company that their affairs should be administered with due care and management. Your Committee have arrived at the conclusion that this has not been done. Hence, the intention of the parliamentary bargain which was in effect made, has not been realized by the Company, and thus the benefit to the consumers which was contemplated when the standard price was fixed nearly a quarter-of-a-century ago has not been obtained." Parliament did not pass the sliding-scale for the purpose of enabling gas companies to increase their dividends by 30, 40, or 50 per cent.; they passed it for this purpose: They saw that, under the old system, the interests of the consumers were not properly cared for; and they said the only way in which they could ensure that the consumers' interests should be properly cared for was by giving the Companies a direct inducement to serve the consumers well. That was the essence of the sliding-scale; and the Committee entirely approved of the principle, and suggested that it should be maintained. Suppose the object for which Parliament granted the sliding-scale were not fulfilled—supposing the consumers did not get the benefit which Parliament expected they would get (there was an implied obligation to look after the consumers on the part of the Company), then it seemed to him that Parliament had a perfect right to say: "You have insisted on your rights to the uttermost farthing; you have divided every farthing you could divide up to the hilt; but you have ignored your obligation and duty to the consumers. Under these circumstances, we refuse to give you the power to raise further capital." The Committee brought forward the present report condemning the Gaslight and Coke Company; and he could not see that Parliament was in any sense wrong in taking such action as this. He thought he might say that it was very probable that Companies in the neighbourhood of London would go to Parliament next year—he was not speaking of the South Metropolitan Company—and, adopting the recommendation of the Committee, accept a reduction of their initial price. This being so, he wanted to put it to the shareholders, that the Gaslight and Coke Company were in a very serious position. In his evidence before the Committee, the Governor said his (Mr. Livesey's) evidence was "hysterical," and that the Directors did not recognize that the Company were in a serious position. To-day, he was sorry to say they still did not recognize the fact. But gas people recognized it; and he believed that members of the Board did so. He was sure his friend to the right there [Mr. Corbet Woodall] did so. But the Governor did not; and if he continued to take his present line, further disaster would come upon the Company. So far from him (Mr. Livesey) being an enemy of the Company, he claimed to be its best friend; and it was for this reason that he stood up, and said what he did say. He did put it to the shareholders that their prosperity was bound up with the prosperity of the consumers. Unless they could satisfy the consumers, and have a comparatively contented body of consumers, things would go badly with them. He felt quite certain that, when the question came up in Parliament next session, Parliament would be very unwilling indeed to upset the findings of the Committee, who, according to the testimony of the Governor, had most patiently considered the evidence. Seven out of the thirteen days had been spent in listening to the evidence given on behalf of the Chartered Company. Their evidence came last; and so they had had an opportunity of replying to all that had been put before the Committee in opposition. He thought the wisest course would be to accept the findings of the Committee; and if he were in the Governor's place he would do so. He would say to the shareholders: "Gentlemen, we are in a serious position; and I want your help to get out of it. I want your practical help; and I want you to forego some of your dividend." So long as they took the uttermost farthing of dividend, they would never get the consumers to believe they were trying to serve them well. It was much to be regretted that the Governor had not announced a reduction in the price of gas, and he was glad to hear Mr. Hounsom's proposal and Mr. Jones's support. If a reduction had been announced, and the Directors had run a little risk, and the shareholders had given up 18s. of their dividend—reducing the £4 18s. to 4 per cent., and lowering the price accordingly—he felt sure it would have inured ultimately more to the prosperity of the Company than anything which had yet been done. If the dividend, as well as the price of gas, were reduced slightly, it would show the public that the Company meant well towards them. With regard to the change of area suggested by the Committee, all he could say about it was that they would find the South Metropolitan Company quite willing to co-operate with the Gaslight Company in coming to a satisfactory arrangement. It was submitted in evidence—Mr. Field said it—that it cost the Company in 1898 2s. 4½d. per 1000 feet to make gas at Nine Elms; and they had to sell this gas in the South for 2s. 2d., or rather it would have to be sold now for 2s. 1d.—a loss of 3½d. Now the Company were under an obligation, in connection with this low price, of supplying the public lamps on the north at the same price as on the south of the Thames; and he calculated—assuming 2s. 4½d. to be the correct figure—that the Company were making a loss of nearly £30,000 a year. The third recommendation referred to the charge made for slot meters. The Committee complained that the Company charged a higher price in the south than in the north. In clause 36, the Committee said: "As the fittings appear to be the same in both areas, your Committee consider that the higher price"—1s. 2½d. per 1000 feet in the south, against 9½d. in the north—"is altogether unjustifiable." He felt sure that, if an announcement could be made that the charge in both districts would be the same, it would give considerable satisfaction. One effect of the recommendations of the Committee was that they would have to go to Parliament every five years to have the sliding-scale revised; and this was not a very pleasant prospect. But if the Companies showed they were endeavouring to do their duty to the consumers—that by all means in their power they were conducting their business so as to give satisfaction, that they recognized that the interest of the consumers was the interest of the Company, and that they meant to deal honestly and fairly with them—he had no fear of parliamentary interference.

Mr. JOHN MEWS said it was the usual practice when people were not satisfied with a thing to cast aspersions upon what had been done, and to find fault with little matters. This was evidently so in the present instance, for such little things had been referred to as that the Committee had not taken evidence upon oath.

The GOVERNOR said, in doing so, he was merely comparing it with the ordinary practice of Committees in dealing with Bills.

Mr. MEWS considered the Committee was a very strong one; and if the recommendations made, on the evidence given, were sound, it was strange there was not more than one dissentient to the report.

The CHAIRMAN said they did not know whether the report was unanimous or not, and they could not know it until they got the Blue-Book.

Mr. MEWS said Mr. Walker had complained that there was no definite finding in the report; but in paragraph 13—which dealt with the allegations against this Company—the Committee said they had fully considered all the evidence, and they were of opinion that the affairs of the Company had not been well managed. If this were not a definite finding, he did not know what could be called one.

A SHAREHOLDER, referring to the general balance-sheet, said he noticed there was an item of £298,555 for automatic meter supplies, which seemed a rather large sum. In the case of the South Metropolitan Company, the amount for automatic meters had been reduced to £20,000; and he should be glad to have some explanation about this.

The GOVERNOR, in reply, said the South Metropolitan Company had got a much smaller sum outstanding with regard to automatic meters. They began earlier than the Gaslight Company with their sinking fund, which had now made itself felt. The Chartered Company were setting aside a sufficient sum to wipe out the cost within a reasonable period. He hoped Mr. Hounsom would not persist in his motion. The Directors needed no pressure to take the earliest possible moment to reduce the price of gas. They had been almost pictured as a set of stupid men who put their backs up and preferred dear gas to cheap gas; but really it was nothing of the kind. The moment they could reduce the price, they would do so. Mr. Livesey rather implied, in his summary of the report, that the Directors were charged with neglect of duty to the consumer; but there was nothing in the report about that. The fact was they had reduced the price of gas 1d. per 1000 cubic feet, and something like 13 millions of money had been saved. They had gone exactly in the same paths—though not so quickly, by reason of their want of increase—as the South Metropolitan Company. Mr. Hounsom had pointed out the grievance of the consumers on the North, that they had to pay 7d. more than in the South; but that also was the case in the Crystal Palace Company's district, where consumers had to pay 5d. more than in the district of the South Metropolitan Company. They had gone down under the sliding-scale one penny at a time, as fast as they could, compatible with their increase. He could assure the meeting that the Directors had not neglected their duty. Mr. Livesey had made a great point that they had divided every farthing in dividend;

but some years ago when they kept something back, he found fault with them.

Mr. LIVESEY said the circumstances then were very different.

The GOVERNOR said they had always looked upon the sliding scale and auction clauses as a practically automatic thing. The sliding scale worked for the benefit of the consumer, and was an inducement to the Company to exercise every possible care and economy. If they were to rip up the agreement, and put in something else, and Parliament was to follow in the footsteps of the South Metropolitan Directors who had spoken, they would have to carry on their business under different auspices altogether, and under different rules. At present, they carried on business under the auction clause and sliding scale; and they had fulfilled the law in the spirit and in the letter. If they had been charged with a breach of the law, it would have been justifiable to say they had done wrong; but no such charge was made against them of having travelled outside their Act of Parliament. He thought the shareholders might safely leave the matter in the hands of the Board. Although he differed on some points with Mr. Livesey, he thought both of them had the same object in view—namely, the benefit of the consumer, which would tend to the benefit of the producer. The shareholders were not a set of avaricious people who desired to get every penny out of the concern. Any such notion he repudiated on his own behalf as well as on behalf of the shareholders. The Parliamentary Committee had not taken sufficient notice of the difference in circumstances which affected the different Companies. If they had done so, they would not have come to the finding to which they had come. However, whenever the question was raised, it would have to be fought out on the floor of the House of Commons. It was a question of vital principle affecting the trade of the country and the credit of Parliament, which could not finally be decided by a mere Committee of Inquiry. He had every confidence in submitting the motion for the adoption of the report and accounts, and in asking the shareholders to trust the Board in the future as they had done in the past.

The resolution for the adoption of the report was then put and carried unanimously.

The GOVERNOR moved a resolution authorizing the payment of the dividends as set forth in the Directors' report.

Mr. WARD seconded the motion, which was carried unanimously.

Mr. HOUNSOM then moved: "That, in the opinion of this meeting, a reduction of 2d. per 1000 cubic feet should be made as from the last meter-taking." He said he was prepared to admit that this was a most extraordinary procedure; but then it must not be forgotten that this was a most extraordinary occasion. He did not want to go at length into the matter, although he could say a great deal as to the past. He thought, in moving the resolution, he was doing as kind a thing as it was possible to do, in order to give the Directors the opportunity of doing something which would be an earnest of what was to come. He much regretted having to propose the motion; but the supreme question was, What was the right thing to do? He believed this was the right course to take; and he felt confident the Board would, in years to come, thank him for having taken it. He put the resolution to the meeting as a protest against the management, or mismanagement, of the Company in the past, and in the hope that they might look for better things in the future.

Mr. BARTLETT seconded the motion.

The GOVERNOR explained that the resolution, if carried, would cost the Company £160,000 a year, and would place them in a very difficult position indeed. In fact, it would involve a reduction of dividend. He appealed to the meeting not to pass the resolution.

Mr. MEWS said, in his opinion, reduced prices would mean increased consumption; so that the Company would gain more than they lost. This had been the case with the South Metropolitan Company.

The GOVERNOR did not question what had just been said; but he might be permitted to remark that the circumstances of the two Companies were not identical.

The resolution was then put and lost by a large majority.

A vote of thanks to the Chairman for presiding, and to the Directors for their management of the Company's business during the last six months, concluded the proceedings.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Cost of Carbonizing Wages—A Reduction in the Price of Gas.

The Half-Yearly General Meeting of this Company was held last Friday, at the Albion Tavern, Aldersgate Street, E.C.—Mr. GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Charles M. Ohren) read the notice convening the meeting; and the Directors' report and the statement of accounts, which were summarized in last week's issue, were taken as read.

The CHAIRMAN said it was with very great regret that he had to open his address by an announcement that one of his colleagues—Mr. Alfred Thomas Layton—passed away the previous day, suddenly and unexpectedly. He was a man whom they all esteemed, and whom they would miss very much on the Board. He was an intelligent, able, and honest man, and was of great assistance to them in the conduct of the affairs of the Company. Moreover, he was a man whom personally they all highly respected. He was appointed an Auditor of the Company in 1877, and was elected a Director in 1890; so that he had given them nine years' valuable services on the Board. The thing that came home to them on occasions like this, when a man fell out of the ranks, was that the work of the world had to be carried on by those who were left behind, however much they might miss him who had gone. Proceeding to the ordinary business of the meeting, his first duty was to move—"That the report of the Directors and the accounts be received and adopted, and the report entered on the minutes." The report on this occasion was very short, because there was comparatively little to tell the shareholders. It had been said that "happy is that nation who has no history;" and when there was nothing to be said, it might be generally assumed that things were going right and prosperously. In the past half year, everything, it might be said, had gone on in a satisfactory manner. It was true there had been an increase in the cost of coal. Their coal contracts were made every twelve months, to expire at the end of March; and on renewing these contracts, they had to pay a material advance—something like 15d. a ton, or including freight 1s. 4½d., over the cost the preceding twelve months. On the other hand, when coal went up in price, there was a compensating advantage—coke might be assumed to rise in price also. But it was not always the case; for sometimes when there had been large accumulations of coke, and the price of coal had gone up, the large stocks of coke had kept its price down. But, fortunately, last year this was not so; and the result was that, whereas in the June half of 1898 they realized only about 4s. 10d. for the coke sold per ton of coal, in the past half year they realized 6s. 3½d. They had also done better with ammonia. In the June half of 1898, they only obtained for ammonia the equivalent of 1s. per ton of coal; but in the past half year they had secured close upon 1s. 6d. The net result was that, whereas in 1898 they received £17,720 for products, in 1899 they secured £24,087, or above £6000 increase. But coal had cost £3300 more. However, the net result gave them a balance more than sufficient to pay the dividend on the half-year's working—in fact, they had a surplus of about £1500. There were some other items that were interesting; but he did not purpose going through in any detail all the figures in the accounts, and would only deal with those in which there was something special to which to draw attention. There was one item to which he thought he certainly ought to allude—that was, the matter of carbonizing wages. For two reasons, he considered it right to draw the attention of the shareholders to this question—first, because it was a very important item of the expenditure; and, secondly, because an attack had been made on the Company, as they were unfortunate enough to have him as their Chairman. Now the Committee appointed by Parliament to inquire into the powers of charge of the London Gas Companies had reference exclusively to the three London Gas Companies—the Gaslight and Coke, the Commercial, and the South Metropolitan; but the Crystal Palace Gas Company also got dragged into the proceedings. Mr. Field, the chief witness for the Gaslight and Coke Company, introduced the question of the carbonizing wages of the Crystal Palace Gas Company. He said: "As a matter of interest, I have been looking at the working of another Company of which Mr. Livesey is Chairman—that is, the Crystal Palace Gas Company. I find there that the wages paid to the manufacturing staff are 3s. 7d.—the same as our own and Mr. Jones's. Therefore it would appear, after all is said and done, that there is not so very wide a discrepancy in the item of wages, as would seem on the face of it, between ourselves and other Companies. Mr. Livesey apparently cannot do better in connection with the Crystal Palace Gas Company than we can do over the whole of our district, and the Commercial in theirs." The question of the carbonizing wages did not depend on the Chairman of a Company, but on the Manager; and, he (the Chairman) thought, in justice to their Manager, he should put this matter right. Mr. Field said their carbonizing wages amounted to 3s. 7d. per ton of coal carbonized. He (the Chairman) had referred to Mr. Field's own book—Field's Gas Analysis—and he could find no such figure. Moreover, Mr. Field was speaking of 1897; and yet he had the figures for 1898, because his book for that year had then been published. He (Mr. Livesey) would give the figures. While Mr. Field said their carbonizing wages were 3s. 7d. per ton of coal carbonized, he found that in 1890, they were 3s. 4·8d., which was the highest they had ever reached. In 1897, they were 3s. 4½d. (not 3s. 7d. as Mr. Field said); and in 1898, 3s. 2·3d.—5d. less, or nearly 5d. less, than Mr. Field's statement. But if they divided it into half years, they would see even a better result. In the half year to June, 1897, it was 3s. 5·9d.; in December, 1897, 3s. 4d.; in June, 1898, 3s. 3½d.; in December, 1898, 3s. 1·1d.; and in June, 1899, it was 3s. 0·6d.—showing a gradual decline; and this decline in face of a considerable rise in wages. Last autumn they increased the wages 7½ per cent., which, on the then half year, added 2d. per ton to the wages; so that, if they had not had this increase, the 3s. 1d. would have been 2s. 11d. Then applying the increase of wages to the past half year, it made a difference of 3d.; and therefore, if it had not been for the increase of wages, they would have been down to 2s. 9½d. He (the Chairman) thought this was a most unfair attack on a Company not concerned, and a most untrue and unjust one; and, in defence of the officers, he felt it was only proper to put the matter right. He might say another word about carbonizing wages. They used to be about 2s. 6d. per ton. Then came the great labour upheaval in 1889; and the men succeeded in getting such a reduction of hours as to increase the cost to 3s. 6d. per ton, or rather more. Anyway, it increased the cost at least 1s. per ton. The Crystal Palace Company paid quite as high wages as any of the other Companies; in fact, they and another Company took the lead in advancing the wages of the stokers last autumn. Others followed; and therefore the wages were the same. But what they contended was that the better spirit displayed by the men in their work, and their willingness to use machinery to its legitimate capacity, had enabled them to bring down the cost of wages to the considerable extent he had shown. He thought Mr. Shoubridge would bear him out that part of the reductions they had effected in this item was due to the use of machinery, and another part to the willingness with which the men now did their work. This willingness applied to the use of machinery also, because where the Unions ruled they had limited the use of the machinery. "The men," they said, "must not do more than so much with a machine." This, he thought, was one of the best evidences of the satisfactory character of the working of this concern, that the cost per ton, even with the increase of wages, was going down so materially half year by half year. They were also improving in the production of sulphate of ammonia. But their Engineer was not satisfied yet; and he would do better no doubt as time went on. Still they were getting more sulphate per 100 tons of coal than they used to do. Another satisfactory item in the accounts was in regard to the slot meters. At the end of December last, they had 8117 meters fixed; and they had added 709 in the half year. These slot meters were put into the houses, gas cooking-stoves, fittings, burners, and everything was supplied, without charge to the consumers; but they were asked to pay an additional 9d. per 1000 cubic feet for the gas. The cost of the pipes put into the houses might be considered, and it was, a legitimate charge on capital; but it was capital that they could never recover. If the householders discontinued the use of gas, it would not pay to remove the pipes. Therefore they charged to a suspense account the cost of the internal pipes. The meters and stoves were charged to capital; but the pipes and fittings were charged to the suspense account, to be liquidated out of the extra money obtained from

the extra 9d. charged per 1000 cubic feet. In June, 1897, the average amount outstanding for these things was 18s. 8d. per consumer; in December, 1897, it was 15s. 4d.; in June, 1898, 14s. 2d.; in December, 1898, 12s. 1½d.; and in the past half-year, it was down to 11s. The total outstanding was £4853 16s.; so the item was being gradually worked off, and it would result ultimately in their having (they had 8800 now, and would soon have 10,000 or 12,000) all these fittings paid for, and no charge standing against the Company for them. This, he thought, was sound business. Having dealt so far with the accounts, he wished to refer to the report. The second item in the report spoke of the reserve fund. The Directors thought it proper to gradually increase it to its old figure; and therefore instead of dividing the odd ½ per cent. to which they were entitled, the shareholders in past years had agreed that this should go towards building up the reserve fund. The ½ per cent. for the past half year represented £346 17s.; and instead of putting this in their pockets as shareholders, they were letting it go to increasing the stability of the Company, so that in bad times they would have a good reserve to fall back upon to meet unexpected charges or losses. The third paragraph of the report dealt with the question of water gas. The Directors had ordered an installation of carburetted water gas; and in regard to its manufacture, they intended to keep perfectly correct and exact accounts. They did not intend to have them mixed up with the coal gas; but they wanted, at any rate so far as this Company were concerned, that everybody should be able to tell what the carburetted water gas cost per 1000 cubic feet. They would let the shareholders and the world know how the Company stood in this matter. Generally the figures were lumped with the coal gas; and no one could tell whether it paid or not. Now the most important point of all was the reference in the last line of the first paragraph of the report. The successful working of the concern, it said, "gives promise that the Directors may shortly be able to announce a reduction in the price of gas." The Directors were prepared to make a reduction of 1d. per 1000 cubic feet in the price of gas dating from the date of the invoices at Midsummer last; but there was a reservation in reference to it. As he explained at the last meeting, and he thought it ought to be recapitulated, the Company had to supply two qualities of gas. When they were last in Parliament, they were very much opposed by the Beckenham people, who obtained a clause giving them authority to have the gas tested in Beckenham; whereas all the other parishes—Lewisham, Croydon, Lambeth, and Camberwell—were content to have the gas tested at the works. Previous to their application to Parliament in 1893, the standard was 14 candles; and it was then raised to 15 candles. To this the Directors did not object; but the Beckenham people said they must have it tested at Beckenham, which was two miles from the works. In order to ensure that the gas was of 15-candle power at Beckenham, they were obliged to enrich it, and to have an independent main to that part of their district. Seeing that the other four parishes were content with the unenriched gas, the money they spent upon enrichment was for the benefit of Beckenham alone; and therefore it would not be just to make the other parishes pay for this. They might take it roughly that the enrichment of the Beckenham gas cost about 1d. per 1000 cubic feet. The Directors therefore proposed that the price should be reduced 1d. per 1000 cubic feet in the other four parishes, and remain at the same figure in Beckenham, unless they could come to some friendly arrangement with Beckenham, because he was certain of this, that the enrichment did not benefit them to the extent of a single penny. They were not a penny the better for it; and yet it cost the Company a good many hundreds or thousands of pounds. Sometimes they did not have to enrich the gas at all, because it was good enough to go to Beckenham. When it was 16 candles as made and sent out, it would test at 15 candles at Beckenham; but when it was only of 15½-candle power, it lost ½ candle probably in travelling to Beckenham, and would be under the test. Therefore, at some periods, they were not subject to the enriching of the gas; and at others they were. But this enrichment—he said it again, and said it deliberately—was an expense that was of no benefit whatever. Half the gas was probably used for heating and cooking purposes; and that which was consumed for lighting was not practically benefited by the enrichment. The Directors would try to convince the Beckenham people on this point; and he was not without hope that they would listen to reason. They were very anxious not to make a difference in price between the parishes. They would open negotiations with Beckenham; and if they could convince them that the enrichment was of no use, they would be very glad indeed. Nothing would please the Board more than to be able to sell gas at Beckenham at the same price as they did in the other parishes. If, however, they insisted on the enriched gas, they must pay for it. Of course, in the parishes where the reduction was made, the slot-meter consumers would also benefit.

Dr. Frederic Hetley seconded the motion, which was unanimously carried.

Mr. Frederic Lane Linging, the Deputy Chairman, moved the declaration of a dividend at the rate of 5 per cent. per annum on the preference stock and 5½ per cent. on the ordinary stock, less income-tax.

Dr. Hetley seconded the motion, which was also passed.

Mr. F. E. Linging thought this was an occasion for congratulation, seeing that the Directors had had such a splendid balance sheet to put before the proprietors. It was only a little more than twelve months ago that Mr. Livesey told them, in his usual straightforward and decisive style, that he thought it would be some considerable period before the Company would again resume its former prosperity. But here they were that day—only twelve months having elapsed—on the bright road to prosperity. It was true that this prosperity had, in some measure, been brought about by the difference in the market value of their residual products, which, of course, the Directors were unable to govern; but, on the other side, there had been very great improvements in the working of the concern during the half year. These were permanent and very valuable; and he thought he might say their Engineer had not yet reached the saturation point in regard to the economies that he had already introduced. He had much pleasure in proposing that the thanks of the meeting be accorded to the Chairman and Directors for the way in which they had conducted the affairs of the Company during the half year.

Mr. Thomas Guyatt seconded the proposition, which was heartily agreed to.

The Chairman, in responding, remarked that the Directors received these votes of thanks with considerable satisfaction; and it was a great encouragement to feel that they had the confidence of the proprietors. It had always been the policy of the Directors to be perfectly frank with the proprietors, and nothing had, or ever would be concealed from them, unless it would be detrimental to the interests of the Company to have it made known. A year or two ago, he felt they were in rather a bad way; but he believed it quite possible to recover their position. That position was being rapidly recovered; and he was glad to think that the shareholders understood and appreciated it. He concluded by moving a vote of thanks to the officers and staff—referring particularly to the sincere devotion of Mr. Shoubridge and Mr. Ohren to the interests of the Company.

Mr. F. L. Linging seconded the motion, which was cordially agreed to.

Appropriate acknowledgment was made by both the Engineer and the Secretary; and the proceedings terminated.

BRENTFORD GAS COMPANY.

The Half-Yearly General Meeting of this Company was held at the Charing Cross Hotel on Friday—Mr. Howard C. Ward in the chair.

The Secretary (Mr. W. Croxford) having read the notice convening the meeting, the minutes of the previous meeting were read and confirmed, and the report and accounts, dealt with in the "Journal" last week, were presented.

The Chairman, in moving that the report and accounts be received and adopted, said there were very few observations he need make, but they were of a very pleasing character. There had been an increase in the sale of gas of no less than 8·28 per cent. This was very satisfactory, considering the sort of weather they had lately experienced. One did not expect, in hot weather, that there would be such a great increase in the sale of gas. He regarded the increase in the sale as a great one. Of course, a good deal of it arose from the additional number of automatic meters. There had been an augmentation in this direction of more than 28 per cent. for the year ending the 30th of June, as compared with the corresponding period of 1898; and of 78 per cent. for the past two years. The meters were used especially for cooking and heating; and people now put out their coal-fires and used stoves with these meters, which, of course, utilized the Company's plant during the daytime, which was a very important thing. The only other matter mentioned in the report, except that of the dividend, to which he need refer was the new plant for the manufacture of water gas at Southall. This was now in complete working order. They had been obliged to build a further installation of a like sort, which would be ready by next winter. A sum of £19,991 had been spent on capital account during the half year. Since the 31st of December, they had received £30,040, £15,000 of which was for premium, and did not bear interest or dividend. This was a good fortification of the capital account of the Company. As far as the revenue account was concerned, there was an increase in the rents received from stoves, in the returns from ammoniacal liquor, and in other items; making a total increase of £15,863. On the other side, there was a much larger quantity of gas sold; so that they had been obliged to use more coal. The addition to the carbonizing wages was not very great; but there was a heavy increase in the wear and tear of machinery. This included a sum of £1000, part of the expenses of converting the horizontal into inclined retorts. He hoped that, when he met the proprietors again, he would be able to inform them that the whole amount expended on altering the plant had been written off, as this would be a permanent reduction. The net result of the half-year's working had been a profit of £40,587, against £38,778 for the corresponding six months of 1898. This amount would allow of the declaration of a dividend of 5 per cent. on the preference stock, 12 per cent. on the consolidated stock, and 9 per cent. on the new stock, 1881. Under the sliding-scale, they were enabled to pay another ½ per cent. dividend; but they had—as he thought, very wisely—put this to the reserve fund. They did not deal with it at this period of the year at all; it was all dealt with in the second half. The reserve fund now amounted to the respectable figure of £4759. He was sure all the proprietors were anxious to see this amount grow.

Mr. Ulick J. Burke seconded the motion.

Mr. W. Hughes expressed the hope that the Company were well secured in the matter of coal contracts.

The Chairman said, if the coal market went up, they would have to pay the same as other people. At the present time they had 192,000 tons still due on their contracts. If the trade of the country continued to flourish as it was doing, he was afraid the price of coal would not go down. Although it had cost the Company £7822 more, products had amounted to about £5300 more, which would go a long way to meet the increase. When the price went up, new pits were opened, and this had a tendency to bring the figure down.

Mr. Hughes remarked that there was an idea at the present time among the coal merchants of London to form a "ring," which he thought was rather to the detriment of the public.

The Chairman said the Directors of a gas company could not interfere with that. The coal merchants must be left to work their wicked will; but this sort of thing generally brought its own reward.

The motion was then put and carried unanimously.

The Chairman then moved that a dividend be declared for the half year ending June 30, 1899, subject to income-tax, at the rate of 5 per cent. per annum on the preference stock, at the rate of 12 per cent. per annum on the consolidated stock, and at the rate of 9 per cent. per annum on the new stock, 1881.

Mr. Burke seconded the motion; and it was carried unanimously.

Mr. Hughes moved a hearty vote of thanks to the Chairman, Directors, Auditors, and officers of the Company.

Mr. Borradaile seconded the motion, which was carried unanimously.

The Chairman having briefly acknowledged the vote, the proceedings terminated.

The Metropolitan Water Commission.—The "Morning Post" says there is reason to believe that, when the Royal Commission on the Metropolitan Water Supply submit their report (which will not now be until November), they will make a recommendation in favour of a new source of supply being found in Wales or elsewhere. The nature, extent, and suggested source of the additional provision will depend on the experiences of the next two months, when the resources of "Water London" will be put to their severest test.

BRISTOL GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Thursday—Alderman J. W. S. Dix in the chair.

The Secretary (Mr. J. Phillips) having read the notice convening the meeting, the report of the Directors was presented. It stated that in the six months ending June 30 there had been an increase of 7 per cent. as compared with the corresponding period of 1898; and that the profit on the revenue account was sufficient to pay dividend and interest, and carry a balance of £5088 to the credit of profit and loss. The Directors mentioned, without comment, the fact that the Bill promoted by the Company to enable them to increase their capital and for other purposes had passed both Houses of Parliament. They recommended a dividend at the rate of 5 per cent. per annum on the nominal capital of the Company entitled to dividend. The accounts accompanying the report showed that £102,218 had been received for gas supplied for public and private lighting, compared with £95,582 in the first half of 1898; that the sale of residuals had produced £37,298, against £23,688; and that the total revenue was £142,613, against £121,982. The total expenditure was £108,435, compared with £97,134; and the balance carried to the profit and loss account £34,178, against £24,848.

The Chairman, in moving the adoption of the report, said there was cause for a great deal of congratulation—showing, as it did, the rapid progress the Company were making. There had been a considerable increase in the consumption of gas; the half year showing an increase of 7 per cent. over the corresponding half year. The number of stoves fixed during the six months was 1980—in July, 394—making a total now in use of 9028. In this respect the Company had a very bright prospect. No doubt, electricity was having an effect in some ways; but gas was finding outlets in other directions. The Board intended to reduce the price of gas by 1d. from July 1; and he supposed everybody would be pleased with that. The Company were in as sound and good a state as any gas company could be. Their Bill had passed through both Houses and received the Royal Assent; so that they had obtained the capital asked for.

The report was adopted, and the dividend of 5 per cent. declared.

The salary of the Secretary was increased by £100 a year; and a vote of thanks to the Chairman concluded the meeting.

PROVINCIAL GAS AND WATER COMPANIES.

We commence to-day our usual notes on the progress made by Gas and Water Companies in various parts of the kingdom whose reports and accounts come to hand about this time:—

Gas.

The total revenue of the Aldershot Gas and Water Company in the six months ending June 30 was £14,871, of which £8350 was for gas, £3211 for water, and £2944 for residuals. The expenditure came to £10,672; so that there was a balance of £4199 to go to the profit and loss account. The amount available for distribution is £7499; and the Directors recommend a dividend of £11 13s. per cent. per annum on the "A" shares, £8 13s. per cent. per annum on the "B" shares, and 7 per cent. per annum on the ordinary "E" shares for the period covered by the accounts. Satisfactory increases have taken place in the consumption of gas in Aldershot and Farnborough; and there has been an improved revenue from residuals.

In the six months ending June 30, the Chester United Gas Company had a revenue of £13,599 from the sale of gas, and of £2875 from the disposal of residuals; the total receipts being £16,871. The expenditure on the manufacture of gas was £7384 (coal and cannel costing £4955); on distribution, £1525; on management, £1194. The total outlay was £11,559; leaving £5312 to go to the profit and loss account. The balance of net profit was £3780; and at the meeting of shareholders last Thursday the Directors recommended the declaration of the usual statutory dividends. It must have been gratifying to the new Engineer and Manager (Mr. J. C. Belton) to find that there was a steady increase in the demand for gas in the past six months. The Chairman (Mr. John Gamon), in moving the adoption of the report, stated that the gas supplied during the half year showed an increase of 4,150,000 cubic feet, which was the largest quantity that had ever been delivered in any corresponding period; and the addition to the gas-rental was £550. They were going steadily, for since April they had had an average increase of a million cubic feet per week. The residuals had brought a better income, and the higher price they had been getting for sulphate was pretty steady—having brought in a revenue of £450. The additional cookers sent out amounted to 103 on the half year, which was more than the whole increase in 1898. There had been an increase of 199 in the prepayment meters; and one prepayment meter was a little better than a public lamp. There had been considerable additional outlay in meeting the increased demand for gas; but they had earned £56 clear profits more than in the first half of 1898. With regard to the future, they had had considerable increase upon their coal contract from the 30th of June last; and as much as 1s. 6d. increase per ton would have to be paid. But the value of residuals would be higher; and with increasing gas supply they were able to look forward to continuing the satisfactory condition of the Company for many years to come. The report was adopted.

At the meeting of the Coatbridge Gas Company to-day, the Directors will report that the hitherto satisfactory aspect of the Company's affairs, financial and otherwise, is maintained. The sales of gas for the half year were 48,632,648 cubic feet; showing the very considerable increase of 9,017,248 cubic feet, or 18½ per cent. The automatic system of supply, which is still expanding, accounts for nearly 2 millions of the increased consumption; the remainder being due to the rapid growth of the district and the increasing demand for gas for cooking and heating purposes. The gross revenue is £8079; the profit being £2448. After deducting £94 18s. 10d. for interest on mortgages, &c., the remainder, with the addition of the balance of £939 brought forward, makes £3292 applicable to dividends, &c. The number of consumers increased during the half year by 224, of which 111 were due to automatic meters. The works and plant, under the supervision of Mr. T. Wilson, are in a thorough state of working efficiency. The unaccounted-for gas was at the rate of 9·83 per cent.; and the average illuminating power of the gas supplied was 22·04 standard candles. The Directors will recommend the payment of maximum dividends at the rate of 10 per cent. per annum on the original stock, and 7 per cent. per annum on the new shares (1877 and 1899) respectively, less income-tax.

At the meeting of the Dorchester Gas and Coke Company, Limited, to-day, the Directors will present accounts showing £1186 available for distribution. This will suffice to enable them to recommend the usual dividends—viz., at the rate of 10 per cent. (free of income-tax) on the ordinary capital, and of 6 per cent. (less income-tax) on the preference capital—and the interest on debentures. The Directors look upon this as very satisfactory, having regard to the advanced price of coal. Improvements are contemplated at the works, which are under Mr. Frank Osmond's supervision; a proposition being under consideration to introduce the regenerative system.

The 50th half-yearly meeting of the Grantham Gas Company was held at the offices last Tuesday—Dr. J. W. Jeans, Chairman of the Company, presiding. The Directors expressed their pleasure in presenting a satisfactory statement of accounts, and added that the consumption of gas continued to increase. The new plant at the works (under the direction of Mr. R. G. Shadbolt) fully answered their expectations; and the progress in the erection of further buildings was likewise satisfactory. They recommended a dividend at the rate of 10 per cent. per annum on the old, and 7 per cent. per annum on the new shares; and this was agreed to.

At the half-yearly general meeting of the Town and County of Poole Gas Company next Monday, the Directors will report a profit of £1408 for the six months ending June 30, against £1169 for the corresponding period of 1898. This enables them to recommend the payment of the full dividend (less income-tax) upon the whole of the capital issued. There has been a further increase of nearly 8 per cent. in the quantity of gas sold—a testimony to the prosperous condition of the works, which are under the supervision of Mr. W. Davis. This prosperity, however, necessitates extensions, especially of the storage plant; and it is proposed to erect an 80-feet telescopic holder in a steel or cast-iron tank. When this work has been completed, the present storage will be trebled. The mains will also be extended. The prosperous condition of the undertaking would have allowed of a reduction in the price of gas but for the recent large increase in the cost of coals, which is equal to a fraction over 3½d. per 1000 cubic feet upon the whole of the gas sold last year. It is proposed to raise £8000 more capital.

The half-yearly report of the York United Gas Company states that the revenue account, after payment of £273 8s. 11d. for interest on mortgages, shows £8654 9s. 5d. available for dividends, amounting to £7333 6s. 8d.; and the Directors recommend dividends of 5s. per share upon the original and 1878 shares, and of 3s. 4d. per share upon the shares created in 1898. When the two half years are taken together, the deficiency upon the year is only £813 12s. 2d.; and this the Directors regard as very satisfactory. The sum of £12,000, being part of the Company's unappropriated profits, has, in pursuance of the recent Act of Parliament, been applied in repayment of mortgages. The gas consumption shows an increase of 4½ per cent. above the corresponding period of last year. The Directors hope to have the works for the manufacture of carburetted water gas in operation before next winter. They are also carrying out an important scheme for remodelling the settings of retorts at the old works upon the regenerative principle, from which they anticipate beneficial results.

Water.

The half-yearly meeting of the Cleveland Water Company was held last Wednesday, at Saltburn—Mr. W. H. A. Wharton presiding. The report stated that, after providing for all expenditure, there remained a balance of £4334, enabling the Directors to recommend a dividend at the rate of £8 10s. per cent. per annum on the original and "A" shares, and £5 19s. per cent. per annum on the "B" shares (free of income-tax); £125 to be reserved for contingencies. This would absorb £3015, and leave £1319 to be carried forward. The report was adopted.

The 51st half-yearly meeting of the Grantham Water Company was held last Tuesday at the offices—Mr. Jno. G. Thompson, J.P., presiding. The report of the Directors showed that there was a balance on June 30 of £6765 upon the revenue account. They proposed that £1750 of this should be applied in the payment of a dividend at the rate of 10 per cent. per annum for the past six months, and that the balance of £5015 should be carried forward. The report was unanimously adopted.

The half-yearly report of the Yeadon Water Company shows receipts amounting to £1552, and expenditure to £612; leaving a net profit of £940. This, with a balance of £344 brought forward, makes the amount available for distribution £1284. The Directors recommend a dividend at the rate of £5 15s. per cent. per annum on the original capital (1870), and £4 0s. 6d. per cent. per annum on the "B" stock (1889). This will absorb £1055 and leave a balance of £229 to be carried forward.

The report of the York Water Company states that the Directors have had under consideration the best method of extending their works; and they propose to erect plant capable of providing a considerable additional supply. They have put down new mains to the extent of 1 mile 573 yards. They recommend payment of dividends, without deduction for income-tax, at the following rates: On the preference shares, 1876, at 5 per cent. per annum; on the preference shares, 1896, at 3½ per cent. per annum; on the ordinary shares, at 10 per cent. per annum; and on the ordinary shares, 1878 and 1879, at 7 per cent. per annum.

The Halifax Town Council and the Dean Head Reservoir.—At the meeting of the Halifax Town Council on Wednesday, the Water Committee recommended that the offer of the Dean Head Reservoir Company to sell their undertaking to the Council for £30,000 be declined. Mr. Hebden asked for some explanation as to how the Committee had arrived at their decision. Mr. Josiah Wade (Chairman of the Committee) replied that the reservoir had been built 60 years, and its holding capacity was 70 million gallons; the drainage area being 540 acres. If they purchased it, they would require a holding capacity of 90 million gallons in the first place; and then there would be the question of filter-beds, &c. The decision had been arrived after very careful consideration. The minute was confirmed.

MANCHESTER CORPORATION GAS SUPPLY.

The Progress of the Gas Department.

At the Meeting of the Manchester City Council on Wednesday, the report of the Gas Committee, with the accounts of the Gas Department for the year ending the 31st of March, the principal portions of which were given in the "JOURNAL" last week, were presented.

Alderman GIBSON, in moving the adoption of the proceedings of the Committee, said they had had a record year. They had carbonized 19,595 tons more coal, and they had secured 237 cubic feet more gas out of each ton. They had consequently produced £34,150 worth more gas than had ever been made. In spite of the competition of the Electricity Committee, they had had 6695 more customers, and their total income had been £594,969, or £41,327 in excess of that in the year 1897-8. These were certainly remarkable figures, and were unparalleled in the history of the gas undertaking. Not only did they rejoice at the success of the undertaking, but also at the fact that they had been able to do so much for the gas consumers. During the past four years, they had reduced the price in some cases 6d., in others 5d., and in others again 3d. per 1000 cubic feet, and they had abolished altogether the charge for meters, while to consumers through the prepayment meters they had given 30 cubic feet of gas, instead of 25 feet as formerly, for 1d. All round, these concessions meant that the Committee had handed over to the consumers in the city no less a sum than £70,000 a year for the last four years; and he thought they had reason to be satisfied with the labours of the Committee. He should like to add—although he had no authority to say it, and no mandate from his Committee, and therefore he only expressed his personal view—that he believed, and firmly hoped, that in the course of another two or three years they would again be able to reduce the price of gas.

The motion having been seconded,

Mr. GRIMSHAW said it was gratifying to have so good a report of the gas undertaking, and to hear from the Chairman of the Committee that there was a prospect of a further reduction in the price. He hoped that, when this was done, the first reductions would be made to the poorer class of consumers; and, further, that the Committee would proceed with the work of making the gas purer.

Mr. SUTTON pointed out that, although the users of prepayment meters had been given an additional 5 cubic feet of gas for 1d., they still paid a larger amount for their gas than any other class of consumers.

Mr. BROCKLEHURST asked for an explanation as to why so large a sum was placed each year to the contingent fund. He expressed the hope that the Committee would consider the desirability of adding to the comfort of the people they employed. He was informed on competent authority that some other corporations paid a greater regard to the comfort and convenience of their workpeople than did the Manchester Gas Committee. They made enormous profits every year, and a little more money might be spent in that direction.

Mr. RUDDIN was understood to say that no complaints were made by the employees.

Alderman HIGGINBOTTOM said, as the Chairman of the Committee knew, he strongly advocated the competition of the electric light; and he did so because he maintained that the gas industry of Manchester would never suffer in consequence of the competition. In offering his congratulations to Alderman Gibson and his Committee, he desired to add that his expectations had been fully realized.

Alderman GIBSON, in reply, said the penny-in-the-slot meters numbered 26,000, and the cry was "Still they come." These consumers appeared to be perfectly satisfied with their treatment at the hands of the Committee; for there was no class who would be more likely to receive attention. Mr. Brocklehurst had asked a very pertinent question. The Committee had placed £21,000 to the contingent fund, and he (Alderman Gibson) had for a long time thought that this fund was altogether inadequate to the large business the Committee had in hand. The Birmingham contingent fund was, by law, compelled to be £100,000; and he thought they in Manchester should, to be secure, have in connection with their gas undertaking a fund of at least £100,000.

The proceedings of the Committee were adopted.

LOUGHBOROUGH GAS-WORKS PURCHASE.

The Terms of Agreement.

At the Meeting of the Loughborough Town Council yesterday week, the Parliamentary Committee presented a report upon this question. They reminded the Council that at the June meeting, they announced that the Gas Company had lodged a petition against the Purchase Bill promoted by the Corporation, and that the Committee had attempted to open negotiations with the Company with the object of avoiding the expense of the Corporation having to meet their opposition in the second House. The Committee were now happy to report that immediately prior to the date on which the Bill was to be heard by the Committee of the House of Commons, the Chairman, the Mayor, the Town Clerk, and the Solicitor were able to arrange terms with the Company, and that, in consequence of such settlement, the petition of the Company was withdrawn. The terms agreed to, which were unanimously approved of by the Committee, are as follows: "(1.) The Company to be regarded as unwilling vendors, and consequently to be allowed 10 per cent. upon the valuation as compensation for compulsory purchase. (2.) The Corporation to pay £500 towards the parliamentary costs of the Company, and also to pay the Company's costs in connection with the arbitration, transfer, and winding up. (3.) The Company's reserve fund is not, for the purposes of the Act, to form part of the undertaking of the Company, but to be retained by the Company. Clauses have been inserted in part 2 of the Bill to give effect to these terms, and the Bill, as amended, has passed the House of Commons, and now only awaits the Royal Assent before being placed upon the Statute Book." Alderman Bumpus moved the adoption of the report, which was seconded by Mr. Wale and carried.

The Leeds Corporation Gas Committee and Water Gas.—The General Manager of the Leeds Corporation Gas Department (Mr. R. H. Townsley) has been asked by his Committee to prepare a report upon the present output of gas, the capacity of the works and possible extensions, and the cost of a carburetted water-gas plant.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 364.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 13	10½	Alliance & Dublin Consumers'	21½—22½	..	4 13 4
100,000	10	"	7½	Do. 7 p. c.	15½—16½	..	4 10 11
800,000	100	July 3	5	Australian 5 p. c. Deb.	102—104	..	4 16 2
200,000	5	May 12	6	Bombay, Ltd.	6½—6¾	..	4 8 11
40,000	5	"	6	Do. New, £4 paid	4¼—4¾	..	5 1 1
880,000	Stk.	Feb. 24	12	Brentford Consolidated	275—280	..	4 5 9
270,000	"	"	9	Do. New	215—220	..	4 1 10
50,000	"	"	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
159,375	"	June 15	4	Do. 4 p. c. Deb.	196—180	..	3 1 7
220,000	Stk.	Mar. 29	11½	Brighton & Hove Orig.	260—270	..	4 5 2
226,320	"	"	8½	Do. A. Ord. Stk.	194—197	..	4 6 4
973,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.	125—130	..	3 16 11
420,000	20	Mar. 29	10	British	45—47	..	4 5 1
50,000	10	Feb. 24	12	Bromley, Ord. 10 p. c.	25—27	..	4 8 11
75,000	10	"	9	Do. 7 p. c.	20—22	..	4 1 10
500,000	10	Apl. 27	6	Buenos Ayres (New) Ltd.	10—10½	..	5 14 3
220,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102	..	3 18 5
150,000	20	July 13	8½	Cagliari, Ltd.	28—29*	..	5 13 10
100,000	10	June 1	7½	Cape Town & Dis., Ltd.	13—14	..	5 7 2
50,000	50	May 2	6	Do. 6 p. c. 1st Mort.	56—58	..	5 3 5
550,000	Stk.	Apl. 13	13½	Commercial Old Stock	316—321	..	4 4 1
200,750	"	"	10½	Do. New do.	245—250	..	4 4 0
200,750	"	June 15	4½	Do. 4½ p. c. Deb.	143—148	..	3 0 10
800,000	Stk.	June 15	10	Continental Union, Ltd.	187—192	..	5 4 2
200,000	"	"	7	Do. 7 p. c. Pref.	182—187	..	3 14 10
51,600	Stk.	Feb. 24	14	Croydon A 10 p. c.	—	—	—
168,400	"	"	11	Do. B 7 p. c.	—	—	—
555,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	135—140	..	3 15 0
60,000	"	"	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd.	22½—23½*	..	4 13 7
354,060	10	"	11	Do. £7 10s. paid	16—17*	..	4 17 1
14,993,075	Stk.	Feb. 10	4⅞	Gas-light and Coke	4 p. c. Ord.	107—110	+2	4 9 1
2,800,000	"	"	3½		3½ p. c. max.	96—100	..	3 10 0
3,799,735	"	"	4		4 p. c. Con. Pref.	126—128	..	3 2 6
3,993,975	"	June 15	3		3 p. c. Con. Deb.	99—101	..	2 19 5
70,000	10	May 31	8	Hongkong & China, Ltd.		13½—14½	..	5 10 4
3,800,000	Stk.	May 12	10	Imperial Continental		223—228	−2	4 7 8
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Deb. Red.		102—105	..	3 6 8
75,000	5	June 15	6	Malta & Medn., Ltd.		5—5½	..	5 9 1
560,000	100	Apl. 4	5	Met. of Melbourne	5 p. c. Deb.	112—114	..	4 7 9
250,000	100	"	4½		4½ p. c. Deb.	110—112	..	4 0 4
541,920	20	May 31	5	Monte Video, Ltd.		12½—13½	−½	7 8 1
617,946	Stk.	Feb. 24	9½	Newc'tle & Gatesh'd Con.		228—235	..	3 19 5
264,855	Stk.	June 29	8½	Do. 8½ p. c. Deb.		106—109	..	3 4 3
						* Ex div.	

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	May 31	8	Oriental, Ltd.	7½—8	..	5 0 0
135,000	5	"	8	Do. New, £4 10s. pd.	6½—7	..	5 14 3
15,000	5	"	8	Do. do. 1879, £1 pd.	1¾—1¾	..	4 11 5
60,000	5	Mar. 29	7	Ottoman, Ltd.	5½—6	..	5 16 8
500,000	100	June 1	6	People's Gas 2nd Mtg. of Chicago Bonds	102—106	..	5 13 2
851,070	10	Apl. 27	7	River Plate Ord.	11¾—12½	+¼	5 14 3
250,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102½	..	3 18 5
250,000	10	Mar. 29	10	San Paulo, Ltd.	17—18	..	5 11 1
135,000	Stk.	Mar. 29	10	Sheffield A.	244—249	..	4 0 4
209,053	"	"	10	Do. B.	244—249	..	4 0 4
447,427	"	"	10	Do. C.	244—249	..	4 0 4
5,600,000	Stk.	Feb. 10	5⅓	South Metrop., 4 p. c. Ord.	141—144	+1	3 14 0
1,460,000	"	July 13	3	Do. 3 p. c. Deb.	100—102*	..	2 18 10
120,000	Stk.	—	6	Tottenham A. 5 p. c. and B. 3½ p. c.	143—145	..	4 2 9
250,530	"	—	4½		103—105	..	4 5 9
55,100	"	—	4	Edmonton 4 p. c. Deb.	115—120	..	3 6 8
182,380	10	June 15	5	Tuscan, Ltd.	9—10	..	5 0 0
149,900	10	July 3	5	Do. 5 p. c. Deb. Red.	98—100	..	5 0 0
				WATER COMPANIES.			
746,184	Stk.	June 29	11	Chelsea, Ord.	315—320	..	3 8 9
150,000	"	"	5	Do. 5 p. c. Pref.	167—170	..	2 18 10
160,000	"	"	4½	Do. 4½ p. c. Pref. '75	148—153	..	2 18 10
175,785	"	Mar. 29	4½	Do. 4½ p. c. Deb.	155—160	..	2 16 3
1,720,560	Stk.	Apl. 18	7	East London, Ord.	214—219	..	3 3 11
654,740	"	June 29	4½	Do. 4½ p. c. Deb.	155—158	..	2 17 0
390,000	"	"	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
700,000	50	June 15	7½	Grand Junction 10 p. c. max.	111—114	..	3 5 9
810,000	Stk.	Mar. 29	4	4 p. c. Deb.	135—140	..	2 17 2
708,000	Stk.	Feb. 10	14	Kent	360—365	..	3 16 9
160,000	"	"	7	Do. New, 7 p. c. max.	210—215	..	3 5 1
1,043,800	100	June 29	10½	Lambeth, 10 p. c. max.	298—303	..	3 9 4
406,200	100	"	8	Do. 7½ p. c. max.	225—230	..	3 9 7
350,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb.	135—140	..	2 17 2
500,000	100	Feb. 11	13⅓	New River, New Shares	430—435	..	3 3 3
1,000,000	Stk.	July 18	4	Do. 4 p. c. Deb.	135—140*	..	2 17 2
902,300	Stk.	June 15	7½	South-ark and Vauxhall Ord.	200—205	−3	3 13 2
126,500	100	"	7½		193—198	..	3 15 9
489,200	Stk.	"	5	5 p. c. Pref.	167—172	..	2 18 2
1,019,585	"	Apl. 13	4	4 p. c. A Deb.	135—140	..	2 17 2
1,155,066	Stk.	June 15	10	West Middlesex	295—305	..	3 5 7
200,000	"	"	4½	Do. 4½ p. c. Deb.	154—158	..	2 17 0
200,000	"	Mar. 10	8	Do. 8 p. c. Deb.	103—104	..	2 17 8
					* Ex. div.		

GAS v. ELECTRICITY FOR STREET LIGHTING AT BOLTON.

At a Meeting of the Bolton Town Council last Wednesday, a short discussion took place on the question of street lighting. It arose out of a resolution passed by the Gas Committee to the effect that it is undesirable at present to accede to an application made by the Electricity Committee for the fixing of 50 electric arc lamps in the central part of the town. From the remarks of the speakers, it appears that considerable feeling has been engendered on the subject of street lighting among the representatives of the two departments. It will be remembered that some time ago the Gas Committee decided to carry out an important experiment of lighting the streets by incandescent gas-lamps; and in view of these trials, the members of the Committee thought it undesirable to comply with the request of the Electricity Committee at the present juncture.

During the discussion at the last meeting, Mr. Lythgoe said that, as there was a difference between the two Committees, the best thing would be for the Council to appoint a Lighting Committee pure and simple. He believed that, if this were done, the question of street lighting would be dealt with effectively. Eventually it was agreed that the whole matter should be referred to the General Purposes Committee, so that something tangible may be done. Supporters of the Electricity Committee argued that they wanted the department to have a fair chance. Alderman Miles, as Chairman of the Gas Committee, said he was quite agreeable that the subject should be discussed by the General Purposes Committee; and as to the suggested appointment of a Lighting Committee, he said he should speak plainly if occasion arose. He reminded the Council that the lighting section had been carried out by the Gas Committee ever since the works were transferred to the Corporation, and now there was an attempt to displace them.

The question of street lighting will now be considered by the General Purposes Committee, who comprise the whole of the members of the Town Council; and subsequently their decision will be brought before the Council for confirmation.

In regard to this question, and in view of certain statements made by the Electrical Engineer in his last report, the Gas Committee have issued a special report. They repeat the statement that the Corporation of Liverpool are the proprietors of the electric lighting works, while the gas-works are owned by a private Company. This is a point, they add, worthy of consideration, seeing that the Liverpool Corporation, although owning an electric plant, are so satisfied with the superior economy and efficiency of incandescent gas-lighting that they actually purchase gas as an illuminant from a private Company rather than use electricity generated at their own works, and that they intend during the next four years to light the whole of the city with incandescent gas-lamps. The report also states that it is noteworthy that the Municipality of Paris, after sending out Commissioners to make exhaustive inquiry on this very subject throughout the whole of Europe, are now extending incandescent gas-lighting.

ELECTRIC LIGHTING NOTES.

The shareholders of the Oswestry Electricity Company have confirmed the sale of their undertaking on the terms agreed to by the Directors. The price to be paid by the Corporation is £11,250, which is £500 less than the Directors originally asked. About 35 out of 40 of the shareholders regard the bargain as a fair one.

The Teignmouth District Council had an unpleasant shock last week when a bill was presented for £514, the cost of obtaining an Electric Lighting Provisional Order. When the Council decided to apply for powers to supply the electric light, it was with the idea that the cost would be about £130. Opposition was, however, offered, with the result that the cost sprang up to more than £500. The Council have decided to try to get powers to borrow the money. If they cannot, an extra rate of 4d. or 5d. in the pound will have to be made in order to pay it.

The electric lighting of the sea-front at Torquay is to be extended to the public gardens and piers. By an ingenious arrangement, the cost of the work will be thrown on the Piers Committee of the Corporation and the Harbour Committee, who, in addition to paying for the current used, are also to pay the interest and sinking fund on the capital outlay. The only effect of this arrangement will be to confuse the accounts of the Electric Light Department. An attempt to glean information as to the difference between the cost of gas and electricity on the piers and gardens failed entirely at the Council meeting last week. One of the members of the Electric Lighting Committee ventured upon the prediction that the town would save by the change; and he told a remarkable story of a lamp on the pier-head which had been left burning for two months because no one could get to it to put it out. But when it came to the question of what was the actual monetary difference between the cost of gas and electricity, all the Chairman could say was that he believed the Electrical Engineer knew—which is indeed very likely.

At the meeting of the West Bromwich Town Council last Wednesday, the Electric Lighting Committee recommended the Council to apply to the Local Government Board for sanction to borrow £30,000 for the purpose of laying down plant and mains for the generation and distribution of electricity. In moving the adoption of the report, the Mayor (Mr. S. Pitt) congratulated the Council upon having retained the right to generate and supply electricity, notwithstanding the efforts of several companies to wrest it from them. When they inquired in the borough with regard to the demand for electricity, the most encouraging replies were received. In the compulsory area of supply, it would take 300-horse power for generating purposes—250 for lighting, and 50 for power. The demand for lighting purposes was estimated to be 171,000 units, and for power 100,000 units. This did not include the power required for working the trams. They had a good demand for electricity outside the specified area of supply; and he assured the Council that they had every prospect of success in the important scheme they were contemplating. A discussion ensued; and it was urged that the report was of such moment that the members of the Council ought to be allowed more time to consider it. Ultimately the matter was deferred for two months.

The St. Helen's Corporation new electric lighting, power supply, and

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
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CARBURETTED WATER-GAS ENGINEERS.

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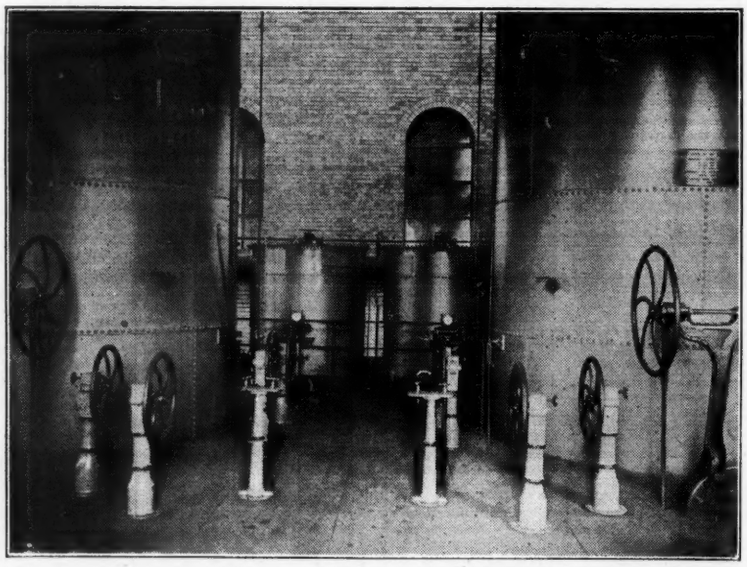

RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.

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refuse destruction works were opened yesterday week, with due ceremony by the Mayor. To commemorate the event, those present were invited to luncheon, at which his Worship sketched the history of electric lighting in the borough. He stated that their first station was opened in 1896; and the plant consisted of two engines developing 200-horse power. In March, 1897, the number of consumers was 25; and in March this year they had 79 customers. There had also been a corresponding increase in the number of lamps from 2630 to 6463, and in the sale of current from 10,000 to 65,000 units. The Gas and Lighting Committee were the pioneers of the work; and credit was due to the Committee and the Chairman, Alderman Cook, for their efforts. The Corporation had purchased the tramways, and leased the system to the present Company. The new plant at the destructor works was equal to 1200-horse power, and had cost £18,214. The work was commenced in June, 1898, and the preliminary run was on June 29 last. The cost of the Warrington Road station was £14,250; and the total cost of the Boundary Road works, including the equipment of the Denton's Green and Prescot sections, was £24,663, exclusive of building, which would mean about £16,000. The amount spent in acquiring the tram-line was £46,000; and the total cost of the undertaking amounted to upwards of £100,000.

THE LONDON COUNTY COUNCIL AND THE WATER QUESTION.

The Condition of the Thames.

At the Meeting of the London County Council last Tuesday, the report of the Water Committee on the present condition of the water supply, to which reference was made in our article on "Water and Sanitary Affairs" last week, was under consideration. Mr. M'Kinnon Wood opened the discussion by asking the Chairman of the Committee (Mr. W. H. Dickinson) if he had heard that the Water Commission had adjourned until November; and he also inquired when it was likely that their report would be ready. Mr. Dickinson replied that he was not aware that the Commission had adjourned; but he could say positively they had not yet reported. He expressed the hope that they would do so before November; but, at any rate, the Council had given instructions to the Committee to proceed with their Water Bills in the coming session. Mr. Beachcroft characterized the report as a humiliating one. He said the Council had opposed all sorts of Water Bills, and had just succeeded in defeating the proposal of the East London Water Company to make further provision for the storage of water; and now they were asking the Local Government Board to allow the Water Companies some latitude in respect to the quantity of water they might take from the Thames. He could not find any anxiety on the part of the general public as to the water supply, although there was apparently a good deal displayed by Mr. Dickinson and the members of his Committee. He hoped to hear what the Local Government Board had done in reply to the Committee's communication. Mr. M'Dougall remarked that if, as Mr. Beachcroft had said, there was no anxiety among the people of London as to the water supply, he could safely say that this feeling existed at the Thames Conservancy Board, on which he represented the Council. The Lambeth, Grand Junction, and Southwark and Vauxhall Companies were now drawing from the Thames 27 million gallons more than their statutory daily limits. The last quantity reported as coming over Teddington Weir was 94 million gallons. On the previous day, it was stated that there were 100 millions; but he had learned, in conversation, that the water at the back of the weir was 3 inches below the top. How it could be possible that the latter quantity could be coming over, in these circumstances, he could not understand. Those who knew most about the situation felt the greatest anxiety; and the Thames Conservancy had considered whether they ought not to write to the Local Government Board and the Water Companies in order to lay the position before them; but they felt it was undesirable at the present juncture to embarrass the Companies. However, there was extremely little water in the Thames. Mr. Dickinson, replying to Mr. Beachcroft, said the East London Company asked leave to build large reservoirs, and to take 10 million gallons more water daily from the Thames. But the Company would not have this work done for ten years; and at present the other Companies were far exceeding their statutory powers, and were drawing water which they were forbidden by law to do. The Water Committee had written to the Local Government Board, but had received no reply beyond a formal acknowledgment of their letter. Passing on to deal with the condition of the Thames, he said that although the river was lower than it had ever been before, he did not wish to say there would be a water famine, because he could not believe the Thames would fall to that extent. However, during July, the average daily total flow, including the water taken by the Companies, was only 250 million gallons. If August and September this year were as dry as the corresponding two months of 1898, the total flow must drop to 180 and 150 million gallons a day respectively for each month; so that with the over-draught occasioned by the needs of East London, it was conceivable that the Companies might take in September the whole of the flow of the Thames. Suppose, however, that the two months named were as wet as they were in 1891, then the flow for August would be 450 million gallons, and for September, 550 millions; if as wet as in 1896, then the figures would be 270 and 880 million gallons. Taking the mean between these extremes, he suggested a probable average flow between 150 and 500 million gallons per day, or just about sufficient for the needs of London. He went on to attribute the present position of affairs to the report of Lord Balfour's Commission. Never was there, he said, a more misleading report, or one which had done more harm to London. The Commission reported that the daily average flow at Teddington would in future be 1350 million gallons; leaving, after the Water Companies had taken all they desired, a large surplus of 1000 million gallons—a figure which he characterized as absolutely absurd in the light of the record of this year, and of the 94 million gallons of the previous week. Thanks to this report, Parliament had, he said, neglected the now pressing question of a Welsh supply, which would give London clean and pure water, in place of the polluted and discredited Thames. The Committee's report was adopted.

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THE CONTEST FOR THE DERWENT WATERSHED.

Satisfaction at the Results.

At the Meeting of the Leicester Town Council last Tuesday, the Water Committee presented a long report on the Derwent Water Bill, which has reached its final stage in Parliament. The Committee trace the steps which led up to the consolidation of the three competing Bills affecting the watershed of the Derwent, and the formation of the Joint Board for carrying out the works necessary for the utilization of the available water, and then deal in considerable detail with the financial and other provisions of the Bill. The Committee expressed their gratification at being able to report so successful a conclusion to their endeavours to secure for Leicester a plentiful supply of water (estimated to amount to some 10 million gallons a day) of unsurpassable quality, and one which would, it was anticipated, suffice for all domestic and trade requirements for a period of nearly half-a-century. The borough of Leicester was to be congratulated on this result of the Council's decision to apply to Parliament; but at present it was impossible to state what the cost of making the application would amount to. Having regard to the magnitude of the scheme, the contending interests involved, which it had been necessary to meet, and the lengthy parliamentary proceedings, the cost would, of course, be large. But whatever might be the total outlay, the Committee were satisfied that it would be more than justified by the object achieved. At the same time, they felt it only right to say that this result was approximately similar to their proposals for an agreement with the other Corporations concerned, made by Leicester before the Bills were introduced into Parliament; and it was to be regretted that their efforts to bring about such an agreement at the time, by which a large proportion of the costs would have been obviated, were unsuccessful. In concluding their report, the Committee thanked the members of the Sub-Committee appointed (consisting of Aldermen Wood, Coleman, and Vincent, and Mr. Biggs) for the great amount of time they had devoted to the business. They also expressed their appreciation of the great services rendered by Mr. J. B. Everard, the Corporation's Consulting Engineer; and they especially wished to place on record an acknowledgment of their indebtedness to the Town Clerk (Mr. J. Bell) for his unremitting exertions to promote and protect the interests of the Corporation, and for the masterly ability shown by him in the performance of an exceptionally difficult and arduous task. They desired to state that they entirely endorsed the resolution of the Committee of the whole Council, recommending that his salary should be increased to £1500 a year, as an acknowledgment of his valuable assistance. The report was adopted; the Chairman of the Committee (Alderman Wood) being warmly complimented for the part he had personally taken in bringing about the consummation arrived at.

The Rotherham Town Council were last Wednesday invited by the Mayor (Alderman F. Mason) to place upon record their appreciation of the services rendered by Alderman Gainsford, and other members of the Sub-Committee of the Sheffield Corporation who had acted with him, in the carrying through of the Derwent Valley Water Bill, and also of Mr. W. H. Holland, M.P. His Worship eulogised the successful work of these gentlemen, and went on to regret the loss that had occurred through the various Authorities not having come to an amicable understanding before they entered Parliament. He calculated that, if they had worked together, there would have been a saving of from £100,000 to £150,000 in expenses. At one time, he also mentioned, it was thought that Rotherham should have a representative on the Joint Board which was to be constituted. But ultimately it had been decided that the town should have a larger representation on the Sheffield Water Committee; and in this way greater advantages and power were secured. In respect to the expenses incurred, probably Rotherham's proportion would not be far short of £6000; but the "water life" of the borough would be extended considerably over 70 years. Mr. Cox seconded the motion, which was unanimously passed. The Council also acknowledged the services in connection with the matter of the Mayor, Mr. Cox, and the Town Clerk.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The annual accounts of the Gas Department of the Broughty Ferry Commissioners were presented at a recent meeting by Mr. J. S. Hood, the Finance Convener. A continued increase in the consumption of gas was reported. In the previous year the total consumption was 36,558,427 cubic feet, and for the year ending May 31 last it was 40,815,522, showing an actual increase of 4,257,095—yielding an income of £7094—the expenditure being £7054, thus showing a credit balance of £40. The estimated consumption for the current year is put at 47,800,000 cubic feet, which, at 2s. 11d. per 1000 cubic feet to consumers within the burgh and 3s. 4d. to consumers outside, and allowing the usual discounts, is calculated to yield £6694; and adding £1463 from coke, &c., yields a grand total of £8157. The estimated expenditure (including £676 to the sinking fund, as compared with £466 the previous year) amounts to £8116; thus showing an estimated surplus of £41 at May 31, 1900. Mr. Hood, in the course of his remarks, offered some criticism on the accounts, and, adverting to the resolution come to on the previous Monday night regarding the providing of facilities free of charge to parties desirous of introducing cookers to their homes, commented on the fact that there was no provision in the estimates for the expenditure that would be thereby entailed, and where this expenditure would end nobody knew. Mr. Christie, the Gas Convener, in moving that the accounts and estimates be adopted, expressed his confidence that they were all right, and said that the resolution as to cookers would lead to a greatly increased consumption of gas, such as would recoup any outlay on that head. He complimented the Manager (Mr. Waddell) on his zeal in attending to the interests of the works. Mr. Thomson alluded to a decrease in the

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items for wages of firemen and labourers and on meters; and in reply to Mr. Christie, stated that the work in conveying coals would be less in future; that there was not so much labour in connection with the purifiers; and that, on account of abnormal expenditure for meters in recent years, it was not now necessary to provide so large an amount. The accounts were adopted; and the price of gas was retained at the present figures.

A gas explosion followed by a fire, in the Forfar Corporation gas-works, was heralded yesterday. The Manager (Mr. Forbes Waddell), is on holiday. The occurrence took place at three o'clock on Thursday morning. There was only one man on duty at the time. He states that while he was drawing a retort, he heard an unusual sound at the back of the retort-house. He went out to see what was wrong; and as he approached the shed in which the station governor is situated, an explosion inside it took place. The flame shot out by the window, and severely burned the man on the face and arms. Observing that the place was on fire, he summoned the fire-brigade, and was himself sent to a doctor to have his wounds dressed. The fire proved a trifling one. The incident is as yet a mystery.

It is given out that in settling their contract for the supply of gas-meters, the Gas Committee of Glasgow Corporation have, contrary to their usual practice, broken up their order among several firms. Messrs. R. Laidlaw and Son, of Edinburgh and Glasgow, have for some time held the contract; and among those who now share it with them are said to be Messrs. James Milne and Sons, Limited, of Edinburgh, and Messrs. Thomas Glover and Co., of London and Glasgow. The number contracted for is about 15,000.

In the Forfar Sheriff Small Debt Court on Thursday, an action was heard in which Charles Shepherd, baker, sued James Soutar, linen merchant, of Forfar, for £3 5s., the cost of gas which the pursuer said he had lost in consequence of an escape in the upper flat of the premises occupied by him. The defender was the proprietor of the property. The pursuer was not tenant of the upper flat; but the gas supply to it passed through his meter. No gas had, however, been used in the flat for several years. At the same time, the pursuer was unaware that the pipes from his meter extended to the top of the house, and he only became aware of the fact on the breaking of a pipe. It was averred that there had been a constant escape of gas since 1895. For the defender, it was maintained that the proprietor could not be held liable for the loss, in respect that he received no notice that a leak existed. Sheriff Substitute Lee sustained the defence; holding that before a landlord can be found liable there must be fault on his part, and, not having received notice of the escape of gas, there was no fault. He therefore gave the defender absolvitor, with expenses.

The Dean of Guild Court of the Burgh of Stranraer, as mentioned in my "Notes" last week, have been exercising themselves—needlessly, I think—over the abstruse question of whether a gasholder is a building in the sense of the Burghs Police Act. At a recent sitting, the Clerk submitted plans of a new holder proposed to be erected by the Stranraer Gas Company on a vacant piece of ground in Market Street, adjoining the present holder. The Dean looked up the Police Act, and could not see a single clause under which the Court could grant authority for the erection of a gasholder, which he did not think was a "building" within the meaning of the Act. Now, I think there can be no doubt but that a gasholder is a building within the sense of the Statute. There are questions for consideration, some of them beyond the sphere of engineering, and others coterminous with it. Dean of Guild Courts have extensive powers. It is not their function to say what a certain structure is, or what it is not, to be used for; but they must be satisfied as to the sufficiency of every part of the structure for the purpose for which it is intended. Thus they might say that the material proposed to be used is unsuitable, and insist upon another being used, or more of it; and so on. If anyone proposed to erect a gasholder within the precincts of a burgh, he will certainly be well advised if he takes the Dean of Guild Court along with him.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 4.

Sulphate of Ammonia.—The week has not given rise to any fresh development in the market, which has remained quiet. But, notwithstanding the moderate business which has passed, values have been maintained at £12 to £12 3s. 9d. per ton f.o.b. at the different ports for prompt delivery. It is noteworthy that, in spite of the policy of abstention so steadily pursued by buyers for some time past, comparatively few parcels have found their way into the market, and it is to this continued scarcity of supplies that the maintenance of values is mainly to be attributed. At the close there is a larger inquiry, which has tempted producers in some cases to ask rather higher prices; but this action has had the effect of making intending buyers pause. For forward delivery, makers' quotations have not been affected, and still are £11 15s. to £12 per ton.

Nitrate of Soda is dearer at 8s. per cwt. for fine quality.

LONDON, *Aug.* 4.

Tar Products.—The production of tar is now at its lowest ebb; and many distillers are doing but little work. Consequently the market is comparatively idle, and little or no material is being offered. Benzols are reported firmer; but it is doubtful whether there is a substantial foundation for the fancy quotations that are being banded about, and there are few makers who are not sold in the meantime. Solvent and heavy naphtha are in heavy request, chiefly for Continental account. The market for creosote, such as is obtainable, is fairly good. Pitch shipments have practically ceased for the season; and any business noted is for late autumn or winter delivery. The nominal quotation for best east coast pitch is higher than it has been for some time, probably in sympathy with the advanced value of coal and other fuel. Anthracene is dull and neglected. Carbolic acid is steady; and for naphthalene there appears to be more inquiry.

The average quotations for the week are: Tar, 16s. to 25s. 6d. Pitch

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east coast 32s., west coast 29s. Benzols, 90's 8d., 50's 10d. Toluol, 1s. 2d. Solvent naphtha, 1s. 2½d. Heavy naphtha, 1s. Crude, 30 per cent., naphtha, 3⅝d. Creosote, 3⅜d. Heavy oils, 62s. 6d. Carbolic acid, 60's 2s. 1d., 75's 2s. 8d. Creosote salts, 50s. Anthracene, nominal, "A" 4d., "B" 2½d. to 3d.

Sulphate of Ammonia.—The market shows a better tone; and business for autumn delivery is now assuming substantial shape. Important transactions are reported at £12 to £12 2s. 6d. less 3½ per cent. in all positions.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire.—It is only natural that, with the extreme heat of the last fortnight, requirements for house-fire consumption should have receded to the lowest possible limit; and, according to the representatives of some of the leading Lancashire collieries, business in the better qualities of round coal has for the present practically gone out. As previously intimated, the rapidly increasing introduction of gas appliances for domestic purposes is still further restricting the consumption of coal. Even in the cheap cottage houses where slot meters are used, gas appliances are now being fitted, not only in the shape of kettle and pan boilers, but in the form of attachments to the ordinary ovens, and even to the wash-house boilers. With the present very small demand for house coals, many of the pits are not running more than three to four days per week; and stocks go on accumulating. But prices are firmly maintained; and it is more than probable that next month, or certainly on the 1st of October, there will be some advance on present list rates. With regard to the lower descriptions of round coal, there has been rather less demand for iron-making purposes, owing to the restriction of the output at many of the works in consequence of the excessive heat. But generally there is a brisk enquiry for manufacturing purposes; and prices are strong. Engine fuel is moving away freely; the output being in fact inadequate to meet requirements, and prices show a continued hardening tendency, although no actual advance is being got, except on forward contracts. At the pit mouth, best Wigan Arley averages 11s. 6d. to 12s. 6d. per ton, Pemberton four-feet and seconds Arley 10s. to 11s., common house coal 9s. to 9s. 6d., steam and forge coal 9s., engine fuel 6s. 6d. to 6s. 9d. for best, 5s. 6d. to 5s. 9d. for medium, and 4s. 9d. to 5s. for common sorts. Shipping is more active, with ordinary steam coal fetching 9s. 6d. to 9s. 9d. delivered at the Garston Docks, 10s. to 10s. 3d. at the High Level, Liverpool, and 10s. 3d. Partington tips, Manchester Ship Canal.

Northern Coal Trade.—The demand for coal is very steady; and there is a scarcity of one or two kinds of fuel. Best Northumbrian steam coals are in brisk demand; and the price has been raised to 13s. per ton, f.o.b., at which quotation it is above the price of best Welsh coal—a very unusual circumstance. Steam small coals are 6s. to 6s. 3d. per ton, and are also scarce. There has been a fuller demand for bunker coals of late; and the prices quoted now vary from 9s. 3d. to 10s. per ton f.o.b. Household coals, on the contrary, are very slow of sale at present; the hot weather limiting the consumption. There is no alteration of moment in manufacturing coals, the steady prices and scarcity continuing. In the gas coal trade, the demand is fairly good for the season; and the shipments are increased since the beginning of this month, so as to allow of the great gas companies increasing their stocks during the period of summer freights ruling. For occasional cargoes of best Durham gas coals, the quoted prices now vary from 9s. 6d. to 10s. per ton f.o.b. No additional contracts of moment have been of late allotted. Gas coke is unaltered in price; 13s. 6d. per ton f.o.b. being the quotation. Stocks are limited, and exports fairly good.

Scotch Coal Trade.—There is a strong market, with prices looking firmer, especially for splint. After the holidays and the settlement of the wages questions, shipments have suddenly improved. The prices quoted per ton f.o.b. Glasgow, are: Main, 9s. to 9s. 3d., ell 9s. 9d. to 10s. 3d., and splint 10s. to 10s. 6d. The shipments for the week amounted to 177,934 tons—an increase upon the preceding week of 25,583 tons; but a decrease upon the corresponding week of last year of 15,995 tons. For the year to date, the total shipments have been 4,910,230 tons—a decrease upon the corresponding period of last year of 472,844 tons.

London Local Authorities and The Gaslight and Coke Company.—According to the "Daily News," Dr. J. Fletcher Little, a new member of the Marylebone Vestry, proposes that "the Vestry invite the Vestries and public authorities of districts supplied by The Gaslight and Coke Company to send delegates to a conference to be held at the Marylebone Court House on an early date, to consider the question of the purchase of the Gas Company for the benefit of the public." Our contemporary characterizes this proposal as a "large order."

The Truro Corporation and the Water-Works.—For a considerable time past, nothing has been heard of the proposal of the Corporation of Truro to purchase the undertaking of the Water Company. The matter has, however, been receiving attention. The Committee of the Town Council who have the matter in hand have now received the report of Mr. J. Mansergh, who was asked to value the undertaking, and to whom the Company proffered every assistance in the execution of the task. Last Wednesday, the Directors received from the Committee an intimation of the sum which the Corporation are prepared to offer for the works. The amount has not been publicly stated; but at the half-yearly meeting of the Company held the same day, Mr. A. A. Willyams, the Chairman, described the offer as one which the Directors could not recommend the shareholders to accept. He added that, if a fair offer were made, the shareholders should be called together to consider it. Some discussion took place as to the desirableness of the Directors meeting the Committee and talking the matter over, with a view to a settlement in the interest of all parties. It was explained that the Directors had not seen the use of meeting the Committee until a definite offer was made. The financial position of the Company, as shown by the half-yearly statement of accounts, was described by the Chairman as most satisfactory. A dividend of 5 per cent. was declared.

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Reduction in Price at Stalybridge.—The gas consumers of Stalybridge are deriving considerable advantage from the progressive management of the gas-works by Mr. William Carr. At last week's meeting, the Council passed a recommendation of the Gas Committee that the price be reduced by 3d. per 1000 cubic feet, making the charge 2s. 3d.

Threatened Litigation with Water-Works Contractors at Morley.—The Town Clerk of Morley has been instructed by the Town Council to write to Messrs. H. & E. Bower, informing them that the Council are advised that the firm are liable for damages for defective work at the Bruntcliffe service reservoir, and that it is the intention of the Council to commence an action against them.

Sales of Shares.—Some £10 shares in the Worksop Gas Company, bearing 8 per cent. dividend, were recently sold for £19 15s. each. On the same occasion, a £100 preference share in the Worksop Water Company, bearing 4½ per cent. interest, was sold for £101. Messrs. Cooper and Wacher lately offered £558 of "A" and "B" stock of the Canterbury Gas and Water Company for sale in £20 lots; and the majority were disposed of at prices ranging from £44 to £44 10s. each. Last Wednesday, Messrs. Spelman disposed of 250 ordinary shares in the Norwich Water Company in 50 lots, each consisting of five shares of £10 each, at £19 to £19 3s. apiece.

The Reduction of Gas and Water Charges at Birkenhead.—At the meeting of the Birkenhead Town Council last Wednesday, Alderman Bloor moved the adoption of the minutes of the Gas and Water Committee, and referred to the proposed reduction in the charge for gas from 2s. 8d. to 2s. 6d. per 1000 cubic feet, as mentioned last week. With regard to the reduced charges for water, he said they had various classes of consumers, but there was a reduction made in every case. The benefit to the gas and water consumers would amount to £6131—£4400 to the former, and £1731 to the latter. They should congratulate themselves upon the result. The minutes were confirmed.

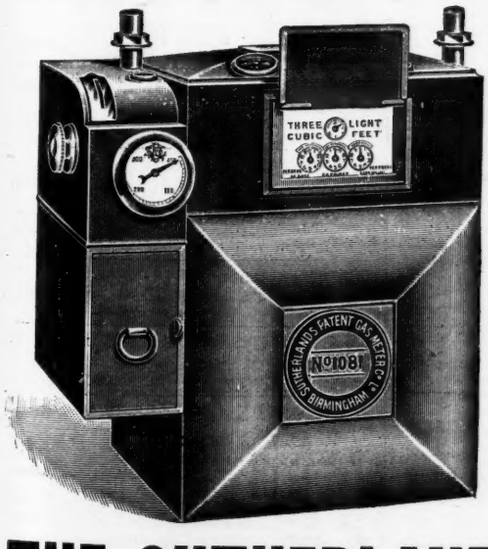
The Price of Gas at Widnes and Wigan.—When the minutes of the Gas Committee came up for consideration at the monthly meeting of the Wigan Town Council last Wednesday, Mr. Worthington referred to the price of gas. He said that in Widnes the price was 1s. 4d. per 1000 cubic feet, while in Wigan it was something like 3s. 1d., subject to discount. He now noticed that it was proposed to increase the borrowing powers of the Corporation by £17,000; and he thought some explanation ought to be given as to the reason for the proposal. Alderman Holmes (the Chairman of the Committee) replied that there was no comparison between Wigan and Widnes, since the former had to supply some of the out-townships and had to contend with greater capital charges than at Widnes. He was as much in favour of lowering the price as anyone, because by so doing they popularized the use of gas; but if they were to have money to reduce the rates, then, of course, they must pay proportionately for the gas. The Council afterwards decided to apply to the Local Government Board for a Provisional Order amending the Wigan Improvement Act, 1874, and the subsequent Local Acts and Orders, by increasing the borrowing powers for gas purposes by the sum of £17,000.

The Felixstowe District Council and the Water-Works.—At the monthly meeting of the Felixstowe District Council last Wednesday, the Finance Committee reported that they had received a notice from the Secretary to the Felixstowe and Walton Water Company of their intention to appoint an arbitrator to ascertain the value of the undertaking. The Committee recommended that no notice be taken of it. The Chairman (Mr. D. A. Cowles) explained that it was necessary, before either the Council or the Company could get clear of the Act as to compulsory purchase, that an arbitrator should be appointed to assess the value of the property. The Clerk (Mr. F. B. Jennings) said that if the Council took no action, the Company would appoint an arbitrator, who would decide the amount they would require for the water-works. On receipt of the arbitrator's decision, the Council would take no notice of the matter, which would then fall through. The Council had abandoned the Act; but the Company were advised by Counsel that this was not sufficient. The matter was referred to a Committee of the entire Council.

Vyrnwy Water for Wallasey.—Further progress has been made towards the attainment of a proper supply of water for the rapidly growing districts of New Brighton, Egremont, Seacombe, and Wallasey. A deputation from the Wallasey District Council has waited upon a Sub-Committee of the Liverpool Corporation; and the conference removed the remaining minor obstacles in the way of giving Wallasey a supply of pure water. It is intended that the main from Norley through Cheshire shall be of 18 inches diameter, and that the Liverpool Corporation shall not be bound to supply a specific quantity of water, but such quantity only as the pipe will enable them to deliver. The meter will be placed at the point where the main crosses the boundary of the Wallasey district; and the price of the water will be at the rate of 6d. per 1000 gallons. It is further proposed that the Wallasey Council shall pay Liverpool a sum equal to 6½ per cent. for interest, sinking fund, and maintenance, and that, after the payment of loan charges, the rate for maintenance shall be 1 per cent. The estimated cost of the works is £90,000.

A Financial Difficulty in Connection with the Purchase of the Bridlington Water-Works.—A private meeting of the Bridlington District Council was held last Wednesday; the business under consideration being the withdrawal and demand for prompt repayment by the Bank of England of the loan recently made of £70,000 at 3 per cent. for the purchase of the water-works by the Council. It is understood that the Bank have declined to enter into any further negotiations with the Council in regard to a loan on any new terms whatever; and they have refused to allow the money to remain out with them. The Council, at the meeting, had before them an offer, made privately through Mr. F. J. Brigham, lately Solicitor to the Council, in regard to a loan of £70,000, at 3⅛ per cent. per annum; the loan to be made for 50 years. The Council in Committee resolved to recommend the acceptance of the offer; and it was agreed to endeavour to obtain for the Council the option of paying off the loan at the end of 10 years. The new negotiations, it was stated, will cost the ratepayers close upon £600. The foregoing particulars were supplied by the Bridlington correspondent of the "Yorkshire Post."

SUTHERLAND'S
PATENT
PREPAYMENT GAS-METERS



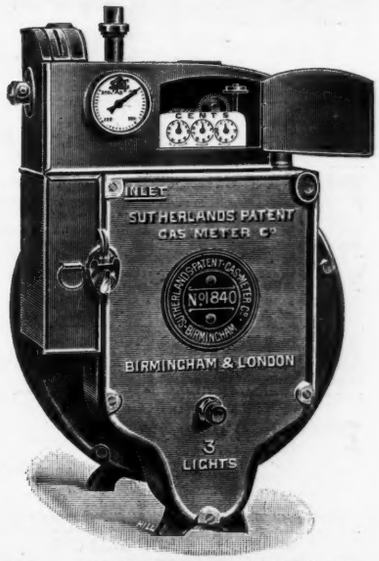
SPECIAL FEATURES:

Accuracy of Measurement.

Simplicity of Construction.

Excellency of Workmanship and Material.

EVERY METER GUARANTEED.



THE SUTHERLAND GAS-METER COMPANY,
ESSEX WORKS, BIRMINGHAM.

Brixham Water Supply.—The difficulty of obtaining a supply of water for Brixham promises to be partly overcome by the fortunate discovery of a fine spring quite close to the town. Some excavation was being carried out at the back of the Victoria Pier when the spring was met with. It is situated a little below high-water mark; and there is at present some doubt as to whether it may not be affected by contact with the sea. Further tests will be made when the tides are suitable, and if the water is found to be pure, the engineering difficulties are not likely to prevent any obstacle to its use; for the town badly needs an increased supply of water.

Condemnation of a New Reservoir by the Local Government Board.—At a meeting of the Winsford District Council last Wednesday, a letter from the Local Government Board was read, the purport of which amounted to a condemnation of the new water reservoir which the Council have had erected at Over. The work of constructing the reservoir was placed in the hands of the late Mr. Waring, a local Engineer. Some friction arose between the Engineer and the Contractor which delayed the work and necessitated the calling in of an Arbitrator. On the death of the Engineer, the services of Mr. H. Bancroft, of Manchester, were secured; and he at once expressed the opinion that the design and construction were faulty, and that the reservoir would not hold water safely unless the Council were willing to expend, in addition to the £4000 they had already spent, a sum of £3000 for strengthening purposes. The Council applied to the Local Government Board for sanction to borrow an additional sum; but as the result of an inspection, the Board now wrote that they found both the workmanship and the materials used in the construction of the reservoir had been exceptionally bad. It appeared to them that the large expenditure now required to put the works into a proper condition was chiefly, if not entirely, due to the absence of efficient supervision during the construction of the reservoir, and that the District Council must be held entirely responsible. It would accord with the usual practice of the Board to decline to sanction a loan for remedying defective work caused by the absence of proper supervision and the use of unsuitable materials; but having regard to the large amount required to remedy the defects, the Board stated that they would be prepared to treat this case as exceptional. They, however, would not allow more than five years for the repayment of any loan which they might sanction for the purpose. During a lengthy discussion, the Council strongly repudiated the satetment that they were to blame for lack of supervision. It was explained that the scheme was placed under the charge of a capable Engineer and the Council had carefully avoided interfering with the Engineer; but they had always expressed their willingness to support him in exercising his powers. Moreover, they were of opinion that the work had been carried out almost entirely in accordance with the original plans of the late Engineer, which the Local Government Board had passed; and, therefore, the Board had some responsibility in the matter which they seemed to wish to shirk. It was eventually decided to call a special meeting to consider what should be done.

Messrs. Biggs, Wall, and Co. have secured an order for about a mile of 12-inch pipes for the Aberystwyth Gas Company, and 370 tons of 7-inch pipes and connections for the Newquay Water Company.

The Gas Commissioners of Falkirk have placed with Messrs. W. C. Holmes and Co., of Huddersfield, an order for one of their patent "new" scrubber-washers to treat 1 million cubic feet of gas per diem.

The following tenders have been accepted by the Carnarvon Corporation: Messrs. Clayton, Son, and Co. for new gas plant, £2277; Messrs. Parkinson and Co. for a station meter to pass 15,000 cubic feet of gas per hour, £254; and Messrs. Waller for engines and exhausters, £246.

The annual outing of the employees of the firm of Messrs. Willey and Co., of Exeter, took place on Saturday, the 29th ult. The party numbered about 900 (including ladies for the first time); and their destination was Plymouth, which they reached by steamers from Calstock. Luncheon was served in the Guildhall—Mr. H. A. Willey in the chair, who had on his left his mother (Mrs. Henry Willey) and on his right Mrs. and Mr. Thomas (the Secretary of the Plymouth Gas Company). The toast of the day—"Prosperity to the Firm"—was proposed by Mr. Thomas, who remarked upon the material progress it had made in the past 35 years. The toast having been drunk with musical honours, Mr. Willey, who had a most enthusiastic reception, responded. In the course of his remarks, he said the prosperity of the firm was largely due to the feeling of confidence that they obtained the support of the gas companies and other industrial undertakings throughout the West of England. He concluded by proposing the toast of "The Employees," who, he said, served him loyally. Other toasts followed, and the company separated; the remainder of the afternoon being spent in visiting places of interest in Plymouth. The whole of the arrangements, which were admirably carried out, were made by the firm, who defrayed the cost of the excursion.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, Palmerston Buildings,
Old Broad Street,
London, E.C.

Andrew Stephenson, Agent. All communications re Oxide to the Company as above.

WINKLEMANN'S ORIGINAL "VOLCANIC" FIRE CEMENT and "VOLCUM" PASTE. Always ready for use in GAS-WORKS. Resists 4500° Fahr.

Andrew Stephenson,
182, Palmerston Buildings,
Old Broad Street, E.C.
"Volcanism, London."

BROTHERTON & CO.
Offices: Commercial Buildings, Leeds. Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "Porter Lincoln."
[For Illustrated Advertisement, see Aug. 1, p. 332.]

AMMONIACAL LIQUOR wanted.
Brotherton and Co., Ammonia Distillers.
Works: Birmingham, Leeds, and Wakefield.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
Read Holliday and Sons, Ltd., Huddersfield.

ECONOMY IN PURIFICATION.

INCREASE the efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. Walker, Limited, Midland Iron-Works, Donnington, near Newport, Salop.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, Oldham; and 45 & 47, Westminster Bridge Road, London, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

MELROSE CYCLES

SHOULD be bought by Gas and Water Officials. Ladies' No. 1, £10 10s.; No. 2, £8 10s. Gents' No. 1, £10; No. 2, £8. Highest Quality. Twelve Months' Guaranty. Sent on approval. Catalogue free. Melrose Cycle Company, Coventry.

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, Chancery Lane, London, W.C.

SPENT OXIDE wanted.
Brotherton and Co., Chemical Manufacturers.
Works: Birmingham, Leeds, and Wakefield.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., Central Plumbing Works, Town Hall Square, Bolton. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "Saturators, Bolton."

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

SULPHURIC ACID for Sale.
Brotherton and Co., Chemical Manufacturers.
Works: Birmingham, Leeds, and Wakefield.

BENZOL, specially made for the Enrichment of Gas.
Ellison and Mitchell, Limited, Kilnhurst, near Rotherham.

SEASON 1899.

BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
FIRE CEMENT, PAINT, and CHEMICALS.
120 and 121, Newgate Street, London, E.C.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to
No. 80, St. Andrew Square, Edinburgh, / Newton Grange, Newbattle, Dalkeith, } Scotland.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the Brimington Carbon Company, Sowerby Bridge, Yorks.

PRACTICAL RETORT SETTER.

GEORGE NUTTALL, 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

GAS TAR wanted.
Brotherton and Co., Tar Distillers.
Works: Birmingham, Leeds, and Wakefield.

SHEFFIELD CHEMICAL COMPANY, LIMITED.

BUYERS of Spent Oxide. Sellers of OXIDE OF IRON and SULPHURIC ACID.

IRON OXIDE (Bog Ore), best quality, for the Purification of Gas, containing up to 85 per cent. Hydrated Oxide of Iron, and absorbing while being used a high percentage of Blue.
S. Bowley and Son, Wellington Works, Battersea Bridge, London, S.W.

GAS-METER Makers wanted. Excellent Situation for Men with good character.
J. Foxall and Co., Sidney Works, Worcester.

WANTED, an experienced Man as WORKING MANAGER, to take sole charge of small Country Gas-Works in Hertfordshire. Annual make, 9½ millions. Assistance in Winter Months. Wages 25s. per week, with House, Coal, and Gas.
Address, with Characters and Experience, No. 8321, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

INSPECTOR wanted for Tunnel Work.
Apply, stating Experience, and giving *copies* of Testimonials, to the SECRETARY, Water Department, 44, Broad Street, BIRMINGHAM.

GAS MAN wanted (single handed) to take charge of small Colliery Plant near Durham. State Wages required and Experience. House and Coal free.
Apply, by letter, to No. 3316, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Two Leading Stokers, accustomed to Regenerative Settings and West's Machine Stoking. For Steady, reliable Men, position permanent.
Apply, by letter, stating Age, References, and Wages expected, to No. 3311, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CORPORATION OF MOSSLEY.

GAS MANAGER.

THE Gas Committee of the above Cor- poration require the services of a Competent Man as MANAGER of their Works. Salary £175 per annum, with House, Coal, and Gas free.
Applications, with *copies only* of not more than three recent Testimonials, to be forwarded to the undersigned on or before Monday, Aug. 14, 1899.
JOSEPH HYDE,
Town Clerk.

CUCKFIELD RURAL DISTRICT COUNCIL.

THE Council require a Working Engineer at their Pumping-Station at Balcombe.
The person appointed will have to look after the Engines, Boilers, and Deep-Well Pumps, keep the same in proper working order, and generally manage and look after the Works under the supervision and direction of the Council's Manager. He must devote the whole of his time to the Council's work.
Salary, 30s. per week, with House, Coal, and Oil.
Applications, stating Age and Experience, and accompanied by not more than Three recent Testimonials, to be sent in to me on or before Monday, the 14th of August, 1899.
EDWARD WAUGH,
Clerk.
Boltro Road, Haywards Heath,
Aug. 4, 1899.

GLASGOW CORPORATION.
(GAS DEPARTMENT.)

STREET-MAIN SUPERINTENDENT WANTED.

THE Corporation invite Applications for the vacant Situation of STREET-MAIN SUPERINTENDENT of their Gas Department.
No person need apply who has not a practical experience in all the duties appertaining to such a position.
Applications, accompanied by not more than three *copies* of recent Testimonials, and stating Age, Experience, present Employment, &c., must be lodged with the Subscriber not later than the 21st inst.
J. D. MARWICK,
Town Clerk.
City Chambers, Glasgow,
Aug. 1, 1899.

FOR SALE—Gas Plant, comprising two Holders (Total Capacity 35,000 Cubic Feet), Scrubbers, Purifiers, Pump, Tar-Tank, Fire-Brick Retorts, &c., &c.
May be viewed upon application to ASHWELL AND NESBIT, LIMITED, Engineers, LEICESTER.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE, cheap to clear—
TOWER SCRUBBER (Walker), 5 ft. by 25 ft. high, complete.
STATION METER, 8-inch, complete and perfect.
EXHAUSTER and ENGINE, combined (Waller), 9-inch Valves, Governors, &c., complete.
GASHOLDER, 35 ft. by 14 ft. deep, only Six Years old.
CAST-IRON TANK, 31 ft. dia., 12 ft. deep, nearly new.
Four 10-feet PURIFIERS, Centre-Valve and Connections.
EXHAUSTERS, sizes from 4000 to 30,000 Cubic Feet per hour in stock.
J. FIRTH BLAKELEY & Co., Gas Engineers, Thornhill, DEWSBURY.

LEIGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Gas Committee of the above Council invite TENDERS for the purchase of TAR produced at their Works for a period of Twelve Months.
Forms of Tender and further Particulars may be obtained on application to the Manager, Mr. John Foster, Gas-Works, Leigh.
Tenders to be sealed, and delivered to me, the undersigned, at or before Twelve o'clock noon, on Saturday, the 19th day of August, 1899.
By order,
PEREGRINE THOMAS,
Clerk and Solicitor.
Town Hall, Leigh, Lancs.,
Aug. 2, 1899.

BUSINESS FOR SALE.

TO Let or Sell, with Immediate Entry— The GAS-WORKS and PLANT at Kincardine-on-Forth as a going concern, with Manager's House, &c.
Offers to be lodged with
CLARK AND ROSS,
Solicitors.
Kincardine, Aug. 1, 1899.

BOROUGH OF HEYWOOD.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the purchase of about 50 Tons of SPENT OXIDE OF IRON.
Specification and Form of Tender and Sample may be obtained upon application to Mr. W. Whatmough, Gas Manager.
Sealed Tenders, endorsed "Spent Oxide," to be sent to me not later than Tuesday, Aug. 15, 1899.
By order,
J. H. BALDWICK,
Town Clerk.
Municipal Buildings, Heywood.
July 26, 1899.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the "Bell" Hotel, Bromley, Kent, on Thursday, the 17th day of August, at Six o'clock p.m. precisely, to receive the Report of the Directors, the Balance-Sheet certified by the Auditors, to declare a Dividend, and for General Purposes.
The TRANSFER BOOKS WILL BE CLOSED from the 3rd to the 17th of August, 1899, both days inclusive.
By order of the Board,
HENRY W. AMOS,
Secretary.
Offices: At the Works,
Bromley, Kent, Aug. 1, 1899.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, Willoughby Lane, Tottenham, on Saturday, the 26th day of August inst., at Three o'clock precisely, to receive the Report of the Directors, and Statement of Accounts for the Half Year ended the 30th day of June, 1899, to declare a Dividend for the same period, and for the Election of Two Directors and Two Auditors for the Ensuing Year, and for transacting General Business.
The TRANSFER BOOKS WILL BE CLOSED for the CONSOLIDATED STOCKS from the 11th to the 28th of August inst., both days inclusive.
By order of the Board,
JAMES RANDALL,
Secretary.
Offices of the Company: Willoughby Lane,
Tottenham, Aug. 4, 1899.

RIDDINGS DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Shareholders of the above Company will be held at the Offices of the Company, No. 30, Gracechurch Street, in the City of London, on Friday, the 25th day of August, 1899, at Half-past Three o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th of June last, to declare a Dividend, to fix the Remuneration of the Secretary, and to transact the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 12th to the 25th of August, both inclusive.
By order of the Board,
ERNEST W. DREW,
Secretary.
Offices: 30, Gracechurch Street,
London, Aug. 4, 1899.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the above Company will be held at the Albion Tavern, Aldersgate Street, in the City of London, on Friday, the 25th day of August, 1899, at One o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th day of June last, to declare a Dividend, to fix the Remuneration of the Secretary, to consider and determine as to the passing of a Resolution for the Conversion or Consolidation into "D" Capital Water Stock of the Company of 3792 fully paid-up "D" Water Shares of £10 each, forming part of the Additional Capital authorized to be raised by the Company's Act of 1883, such Stock to be divided among the holders entitled to the said Shares according to their respective interests therein, and to transact the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 12th to the 25th of August, both inclusive.
By order of the Board,
ERNEST W. DREW,
Secretary.
Offices: 30, Gracechurch Street,
London, July 21, 1899.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.
For Particulars, Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.
Prices are Reduced.

THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED.

NOTICE is Hereby Given, that the Creditors of the above-named Company are required, on or before Monday, the 18th day of September, 1899, to send their NAMES and ADDRESSES and the PARTICULARS of their DEBTS or CLAIMS, and the Names and Addresses of their Solicitors (if any), to John Nicoll, of 111, Palace Chambers, Westminster, S.W., the Liquidator of the said Company; and, if so required by notice in writing from the said Liquidator, are, by their Solicitors, to come in and prove their said Debts or Claims at such time and place as shall be specified in such notice, or in default thereof they will be excluded from the benefit of any distribution made before such Debts are proved.
Dated this 4th day of August, 1899.
LUMLEY AND LUMLEY,
15, Old Jewry Chambers, E.C.,
Solicitors to the above-named Liquidator.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

"A most useful Book of Reference, which no Water-Works Engineer should be without."

Notes on Water Supply

Containing References, Tables, Notes, Memoranda, and Detailed Advertisements in Relation to Water-Works Engineering; also Illustrated Description and Prices of Apparatus, Appliances, Tools, and Material required on a Water-Works.

By J. T. RODDA,

Assoc.M.Inst.C.E., Assoc.M.Inst.Mech.E., Member of the British Association of Water-Works Engineers.

PRICE 5s.

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WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

NITRATE of Thorium and Cerium. FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND CO., HAMBURG.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
GAS ENGINEERS' AGENTS AND CONTRACTORS FOR
Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

COKE-BREAKERS,

PRICES REDUCED.
(THOMAS & SOMERVILLE'S PATENT)
With Elevators and Conveyors worked by Steam or Gas Engine.

GEORGE WALLER & CO.,
165, QUEEN VICTORIA STREET, E.C.;
And at STROUD, GLOUCESTERSHIRE.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS,
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

ENRICH YOUR GAS
WITH CHEAP
BENZOL
SPECIALLY PREPARED, FREE FROM SULPHUR.
AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.
Apply to SADLER & CO., MIDDLESBROUGH.

DISPENSE WITH CANNEL COAL
and
INCREASE YOUR ILLUMINATING POWER
by using the
WHESSOE-MUNICH BENZOL CARBURETTER
The Cheapest and Best in the Market.
The Managers of Tynemouth, Middlesbrough, and Darlington Gas-Works are much pleased with it, and would not be without it.
Apply to the Sole Makers:
THE WHESSOE FOUNDRY COMPANY, LIMITED,
DARLINGTON.

HOLMSIDE
GAS COALS.
Present Daily Produce over 5000 Tons.
Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.
Present Daily Produce available 3000 Tons.
Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.
Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.
These Coals may be bought through the Principal Merchants in England, or direct from
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HOLMSIDE & SOUTH MOOR OFFICES,
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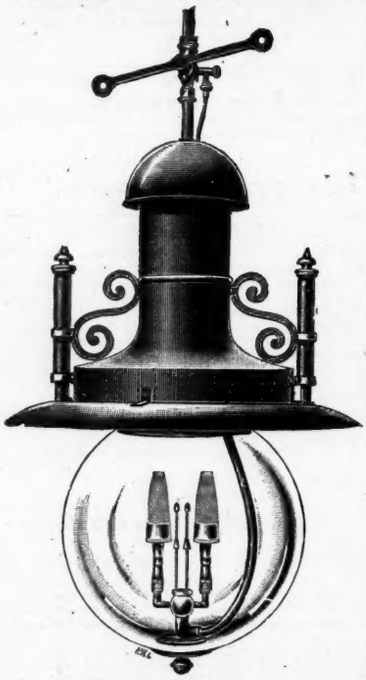
UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY
RAVENSTHORPE, NEAR DEWSBURY.

JAMES OAKES & CO.
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

THE PATENT
"BEACON" GLOBE LAMP.

As fitted at London Bridge near Railway Approach, three Lamps giving the Illuminating Power of 600 Candles. See Surveyor's Report as published in the "*JOURNAL*" for Jan. 10, 1899.
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DALKEITH N.B.

BOLDON GAS COALS.
ANALYSIS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
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TYNE
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Yield of Gas per ton	13,155 cub. ft.
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Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
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JAMES MILNE & SON, LTD.,
GAS ENGINEERS
MILTON HOUSE WORKS EDINBURGH.
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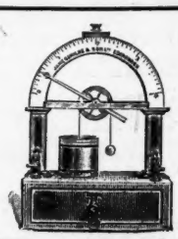

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Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
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OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

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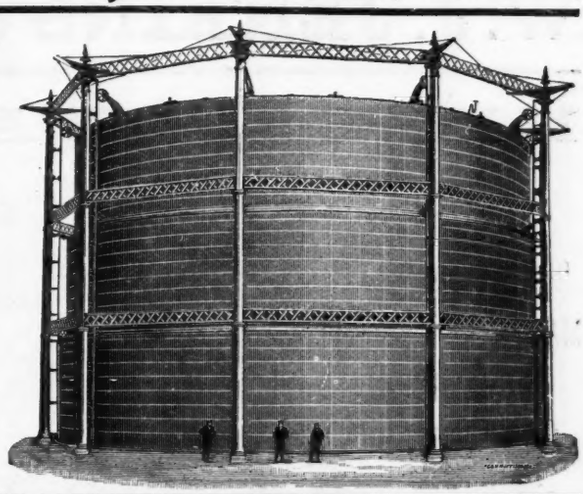

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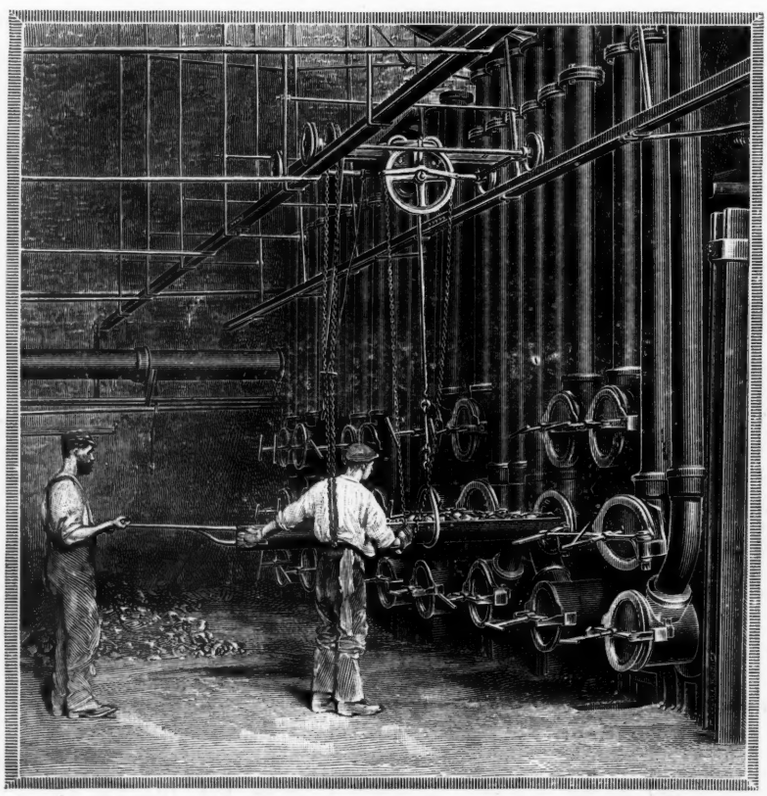

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FINSBURY,
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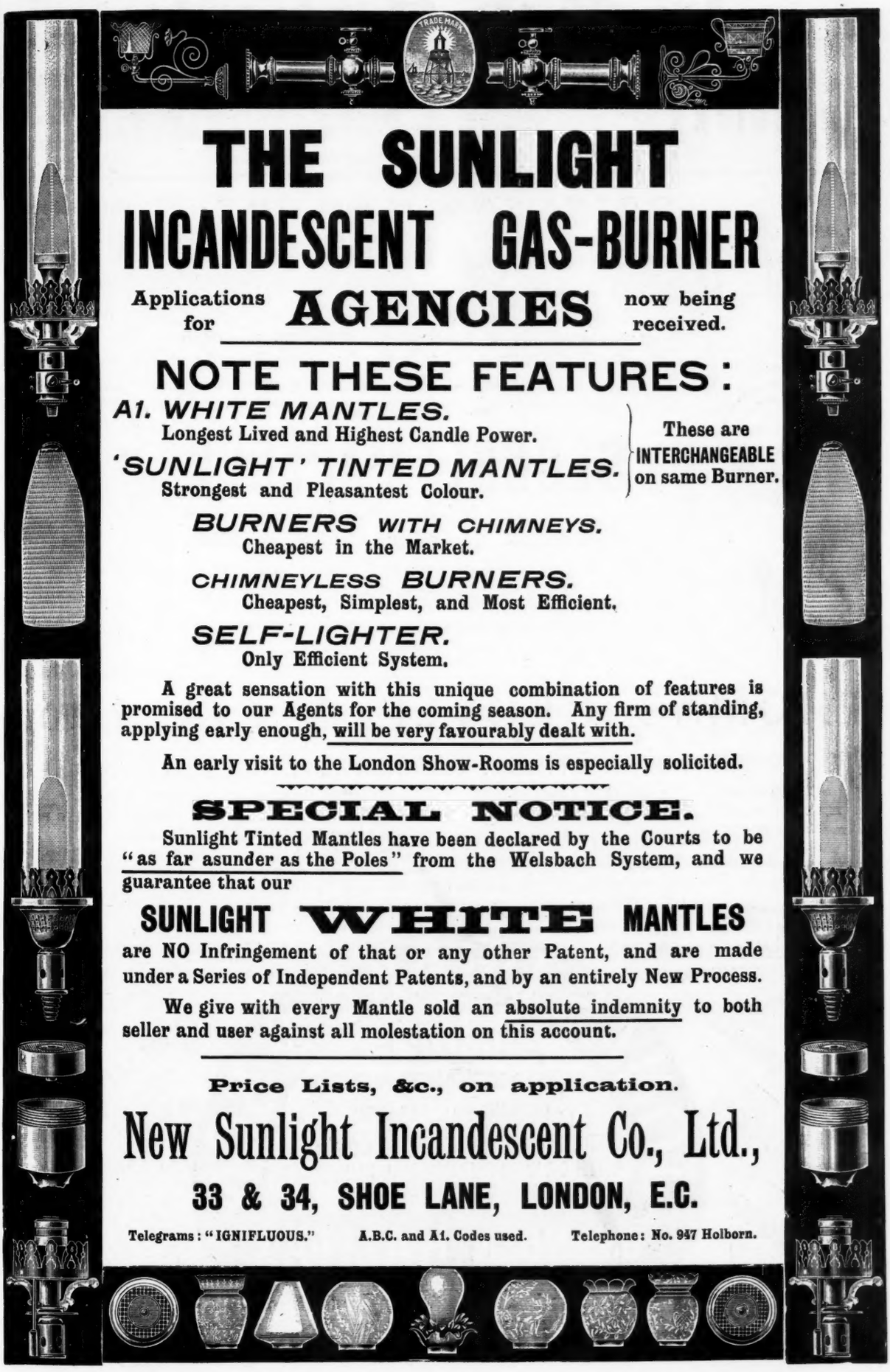

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For Prices and Analysis, apply as above.

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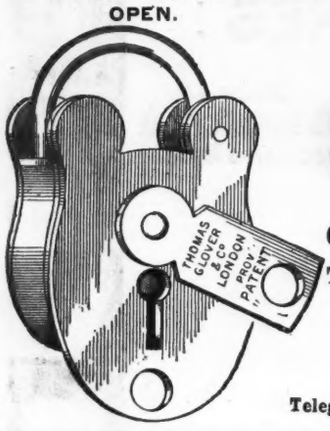

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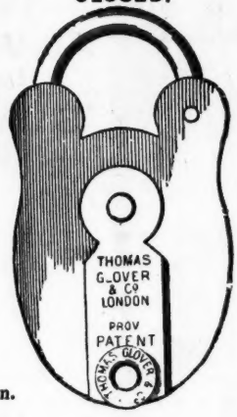

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Established 1860.

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FOR
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[See Illustrated Advertisement, Aug. 1, p. 278.]

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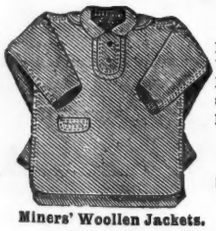
Bellows made to inflate a 48-inch Bag under One Minute.



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PIONEERS OF NO CHIMNEYS,

still hold their own on the market for the

HIGHEST CANDLE POWER

for each Cubic Foot of Gas at ordinary Pressures.

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550-CANDLE POWER,

which speaks for itself.

The Syndicate works under the

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STILL AHEAD OF ALL RIVALS;

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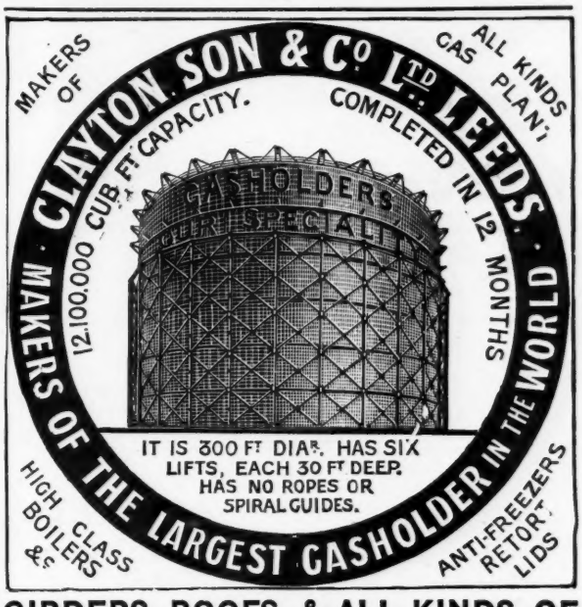
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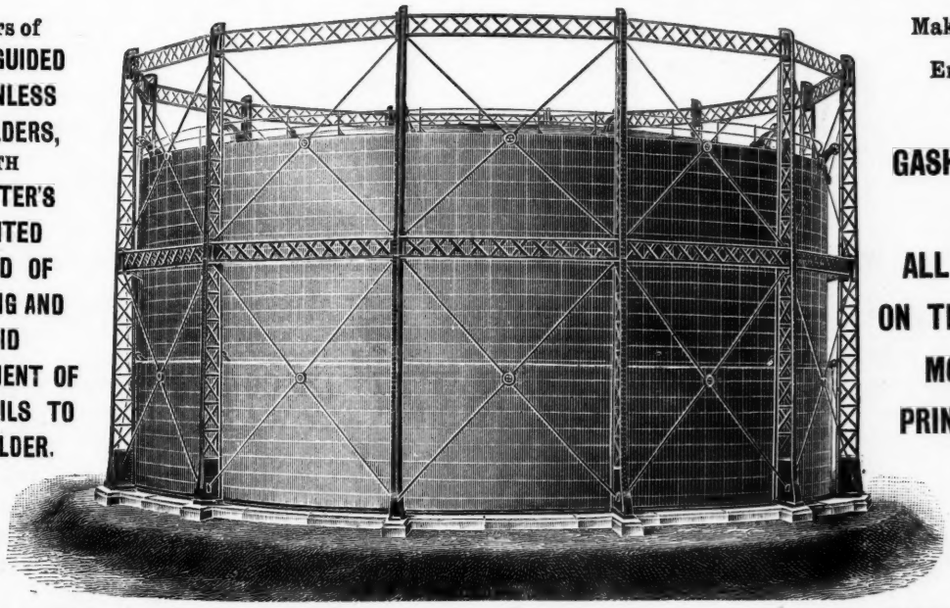

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FITTED WITH SIX COLUMNS and GIRDERS,
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Telephone No. 1101.

[See also Advt. p. 354.

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